拓展署
Territory Development Department
新界西拓展處
NEW TERRITORIES WEST DEVELOPMENT OFFICE

Agreement No. 合約編號CE 26/94

Tsuen Wan Bay Further Reclamation, Area 35

Engineering, Planning and Environmental Investigation

荃灣海灣進一步的填海工程 - 第35區

工程、規劃及環境研究

VOLUME 7 : ENVIRONMENTAL MONITORING & AUDIT MANUAL

卷七：環境監察與審核手冊

Issue 2
May 1998

MAUNSELL CONSULTANTS ASIA LTD
茂盛(亞洲)工程顧問有限公司

in association with 聯同

Shankland Cox Ltd 森蘭郭斯
MVA Asia Ltd MVA 亞洲顧問公司
Consultants in Environmental Sciences (Asia) Ltd 環境科學顧問(亞洲)有限公司
...aulics and Water Research (Asia) Ltd 水力水研(亞洲)有限公司

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ENVIRONMENTAL MONITORING AND AUDIT MANUAL

FINAL REPORT

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1 INTRODUCTION

1.1 Purpose of the Manual

1.1.1 The purpose of this Environmental Monitoring and Audit (EM&A) Manual is to guide the set up of an EM&A programme to ensure compliance with the Environmental Impact Assessment (EIA) study recommendations, to assess the effectiveness of the recommended mitigation measures and to identify any further need for additional mitigation measures or remedial action. This Manual outlines the monitoring and audit programme for reclamation works related to the Tsuen Wan Bay Further Reclamation Area 35. It aims to provide systematic procedures for monitoring, auditing and minimizing environmental impacts associated with construction works.

1.1.2 Hong Kong environmental regulations for air and water quality, noise and waste, the Hong Kong Planning Standards and Guidelines, and recommendations presented in the EIA study for Tsuen Wan Bay Further Reclamation Area 35 have served as environmental standards and guidelines in the preparation of this Manual.

1.1.3 This Manual contains the following:

- responsibilities of the Contractor, the Engineer or Engineer's Representative (ER), Environmental Team (ET), and the Independent Checker (Environment) (IC(E)) with respect to the environmental monitoring and audit requirements during the course of the project;
- information on project organization and programming of construction activities for the project;
- the hypotheses of potential impacts, the basis for, and description of the broad approach underlying the environmental monitoring and audit programme;
- requirements with respect to the construction schedule and the necessary environmental monitoring and audit programme to track the varying environmental impact;
- the specific questions and testable hypotheses that the monitoring programme is designed to answer;
- full details of the methodologies to be adopted, including all field laboratory and analytical procedures, and details on quality assurance and quality control programme;
- the rationale on which the environmental monitoring data will be evaluated and interpreted and the details of the statistical procedures that will be used to interpret the data;
- definition of Action and Limit levels;

- establishment of event and action plans;
- requirements of reviewing pollution sources and working procedures required in the event of non-compliance of the environmental criteria and complaints;
- requirements of presentation of environmental monitoring and audit data and appropriate reporting procedures; and
- requirements for review of EIA predictions and effectiveness of the environmental monitoring and audit programme.

1.1.4 For the purpose of this manual, the "Architect/Engineer" shall refer to the Architect/Engineer as defined in the Contract and the Architect/Engineer's Representative (A/ER), in cases where the Architect/Engineer's powers have been delegated to the A/ER, in accordance with the Contract. The ET leader, who shall be responsible for and in charge of the ET, shall refer to the person delegated the role of executing the environmental monitoring and audit requirements.

1.2 Background

1.2.1 Reclamation was first undertaken in Tsuen Wan Bay to provide land for industrial development in the late 1920's and 1930's. During the 1950's, new reclamation was progressively undertaken to provide more land for industrial, residential and commercial uses. In the 1980's reclamations were undertaken to accommodate new roads and Tsuen Wan Public Cargo Working Area (TWPCWA) and some private moorings.

1.2.2 Recognising the need to improve land use and transport infrastructure in the area, the Tsuen Wan Development Office carried out an in-house preliminary study in 1986. This study concluded that a detailed investigation into Tsuen Wan Bay (TWB) further reclamation should be carried out. This finding was endorsed by the Development Progress Committee in 1987.

1.2.3 Following the endorsement of Metroplan by the Executive Council in 1991, planning studies were undertaken in 1992 to formulate a Development Statement for Tsuen Wan, in order to study the implementation of Metroplan concepts at the district level. In 1993, the Land Development Policy Committee (LDPC) endorsed the "Tsuen Wan - Kwai Tsing Development Statement" as the framework to guide the planning of the area. Furthermore, LDPC endorsed the need to undertake an engineering feasibility, planning and environmental study on the proposed TWB further reclamation. The reclamation project is currently in Category B of the Public Works Programme. Completion of the reclamation is currently scheduled for 2006.

1.2.4 On 20 June 1995 the Territory Development Department (TDD) of the Hong Kong Government commissioned Maunsell Consultants Asia Ltd (MCAL) as the lead consultants for the TWB further reclamation study (TWBFRS). CES (Asia) Ltd are acting as the environmental consultants to MCAL. The purpose of the study is to investigate the feasibility of carrying out further reclamation in TWB, Area 35 with a view to providing necessary facilities to enable key planning objectives to be fulfilled. The

study area and the proposed area for reclamation are shown in **Figure 1.1**.

1.2.5 The site is located in an embayment created by previous reclamations. The bay currently serves a Public Cargo Working Area (PCWA) and is a Dangerous Goods Anchorage (DGA). Both of these activities will need to be relocated before the reclamation activities can proceed. The PCWA will be reprovisioned in a reclaimed area close to the former Stonecutter's Island. Site selection for the reprovision of the DGA has been the subject of a separate study, managed by Marine Department. It is understood that this study has recommended a location to the south of Ma Wan as the preferred location for the new DGA.

1.2.6 The proposed site is an area of water in the Rambler Channel bounded by land on three sides that is currently used as a Dangerous Goods Anchorage (DGA) and serves a Public Cargo Working Area (PCWA). To the north west lie the 41 storey blocks of Belvedere Garden set back about 60 m from the waterfront and further west Greenview Court, about 160 m from the water and Bayview Garden about 60 m from the water. North west are some industrial blocks about 60 m from the waterfront and 20 m from the nearest block of Belvedere Garden. Castle Peak Road lies behind these buildings around 140 m from the waters edge and a new road designated "2/1", namely Hoi On Road, has been completed in front of these buildings. This road is designed to link up with the planned Castle Peak Road improvement scheme, due to be completed in 1999, but is at present very lightly loaded with traffic.

1.2.7 The interchange between Castle Peak Road, Tsuen Wan Road and Tuen Mun Road lies to the north of the site, behind one of the industrial blocks. To the east between Tsuen Wan Road and Hoi Hing Road is the Hing Shing Temporary Housing Area (THA). Tsuen Wan PCWA is located on the waterfront in this area. Clague Garden Estate is located east of Tsuen Wan Road around 150 m from the waterfront. Just beyond the southern edge of the study area is a transport interchange with a bus and ferry terminus.

1.2.8 Directly south of the site there are some residential receivers on Tsing Yi Island, namely Ching Tai Court and Cheung Fat Estate. These are around 540 m from the southern edge of the reclamation. Sensitive receivers close to the proposed reclamation have been identified in accordance with the definitions given in the HKPSG. These receivers are located in **Figures 1.2** (Air and Noise) and **Figure 1.3** (Water), and are summarised in **Table 1.1**. In addition to the receivers shown, land uses on the TWB reclamation will result in future sensitive receivers.

Table 1.1 Existing Sensitive Receivers

SR Identification	Sensitive to Air Quality, Noise, and/or Water Quality:			Closest Distance to TWBFR	Description
	A	N	W		
Bayview Garden	✓	✓		60 m	5 30-storey residential towers
Greenview Court	✓	✓		160 m	3 26-storey residential towers
Belvedere Garden A	✓	✓		160 m	9 41-storey residential towers
Belvedere Garden B	✓	✓		60 m	7 41-storey residential towers
Belvedere Garden C	✓	✓		160 m	3 41-storey residential towers
Hing Shing THA	✓	✓		60 m	2-storey THA dwellings
Clague Garden Estate	✓	✓		150 m	40-storey residential towers
Ching Tai Court	✓	✓		540 m	32-storey residential blocks
Cheung Fat Estate	✓	✓		540 m	34-storey residential blocks
Approach Beach	✓		✓	1.4 km	Gazetted beach
Ting Kau Beach	✓		✓	2 km	Gazetted beach
Lido Beach	✓		✓	2.3 km	Gazetted beach
Casam Beach	✓		✓	2.5 km	Gazetted beach
Hoi Mei Wan	✓		✓	2.9 km	Gazetted beach
Gemini Beaches	✓		✓	3.3 km	Gazetted beach
Anglers Beach	✓		✓	4.5 km	Gazetted beach
Ma Wan Tung Wan	✓		✓	4 km	Gazetted beach
Ma Wan Mariculture Zone			✓	5 km	Mariculture zone
Tsuen Wan Intake			✓	within site	Water intake
Oil Depot Pump House			✓	500 m	Water intake
Kwai Chung Incinerator			✓	2.3 km	Water intake
Tsing Yi Intake			✓	2.3 km	Water intake
Stage I Phase I Intake			✓	3 km	Water intake
Oil Depot Pump House			✓	3.5 km	Water intake

1.2.9 Criteria for evaluating impacts from noise, air quality and water quality at sensitive receivers during the reclamation works are summarised as follows:

Noise

1.2.10 The Noise Control Ordinance (NCO) provides for the control of construction noise. Assessment procedures and standards are set out in three Technical Memoranda (TM) issued under the Ordinance: the *Technical Memorandum on Noise from Construction Work other than Percussive Piling* (updated in March 1996), the *Technical Memorandum on Noise from Percussive Piling* and the *Technical Memorandum on Noise from Construction Work in Designated Areas*.

1.2.11 Under the existing provisions, there is no legal restriction on noise generated by construction activities (other than percussive piling) between the hours of 07:00 and 19:00 on normal weekdays. However, EPD's *Practice Note for Professional Persons PN 2/93* sets a non-statutory daytime noise limit of 75 dB(A) $L_{eq\ (30\ min)}$ at the facades of dwellings, and 70 dB(A) at the facades of schools (65 dB(A) during examinations). These formed the criteria for evaluating the noise impact on sensitive receivers during reclamation, since it is understood that all normal works will be restricted to day time hours on normal weekdays.

Air Quality

1.2.12 For dust emissions from construction activities, it is generally accepted that an hourly average total suspended particulates (TSP) concentration of 500 μgm^{-3} should not be exceeded. The maximum acceptable TSP concentration averaged over a 24-hour period is 260 μgm^{-3}, as defined in the AQOs.

Water Quality

1.2.13 Principal legislation for planning against water pollution is the Water Pollution Control Ordinance (WPCO), which allows for the gazetting of Water Control Zones (WCZs) within which the discharge of liquid effluent and the deposit of matter directly into water bodies or into drains are controlled. The waters close to Tsuen Wan Bay are in the Western Buffer WCZ and the Victoria Harbour Phase I WCZ. Water Quality Objectives (WQOs) are declared for each of the WCZs and they are shown in **Tables 1.2 and 1.3**. The standards for effluent (including runoff from construction site) discharged into the WCZs, as stated in the *Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters* (TM) are shown in **Table 1.4 and 1.5**.

1.2.14 At bathing beaches, permissible standards for effluent must be consistent with the Bathing Beach Water Quality Objectives (which set standards for the indicator bacterium, *Escherischia coli)*. The primary concern for safeguarding water quality at gazetted beaches is to limit pollutants that pose a risk to health, such as bacteria and other pathogens. The HKPSG states that no discharge outlet should be located within 100 m of the boundaries of any bathing beach. In addition, Section 9.1 of the TM states that no new effluent will be allowed within 100 m of the boundaries of a gazetted beach in any direction, including rivers, streams and stormwater drains.

1.2.15 The Water Supplies Department has a set of sea water quality objectives for flushing

purpose. The standards at the point of abstraction are presented in **Table 1.6**.

Table 1.2 Water Quality Objectives for Marine Waters of Western Buffer WCZ

Parameter	Objective	Part(s) of Zone
E. coli	annual geometric mean not to exceed 610/100 ml	secondary contact recreation subzones; fish culture subzones
	geometric mean not to exceed 180/100 ml during March to October inclusive in 1 year; sample should be taken at least 3 times in 1 calendar month at intervals of between 3 to 14 days	bathing beach subzones
	geometric mean of the most recent 5 consecutive samples taken at intervals of between 7 and 21 days not to be less than 1/100 ml	water gathering ground subzones
	geometric mean of the most recent 5 consecutive samples taken at intervals of between 7 and 21 days not to exceed 1000/100 ml	other inland waters
Dissolved Oxygen within 2 m of bottom	not less than 2 mg/L for 90% samples	marine waters
	not less than 2 mg/L for 90% samples	fish culture subzones
Depth averaged Dissolved Oxygen	not less than 4 mg/L for 90% samples	marine waters except fish culture subzones
pH value	within the range 6.5 to 8.5; change due to waste discharge not to exceed 0.2	marine waters except bathing beach subzones
	within the range 6.5 - 8.5	water gathering ground subzones
	within the range 6.0 - 9.0	other inland waters
Salinity	change due to waste discharge not to exceed 10% of natural ambient level	whole zone
Temperature	change due to waste discharge not to exceed 2 °C	whole zone
Suspended solids	waste discharge not to raise the natural ambient level by 30%, nor cause the accumulation of suspended solids which may adversely affect aquatic communities	marine waters
	annual median not to exceed 20 mg/L	water gathering ground subzones
	annual median not to exceed 25 mg/L	other inland waters
Toxicants	not to be present at levels producing significant toxic effect, carcinogenic, mutagenic or teratonogenci effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chains and to interactions of toxic substances with each other	whole zone
	not to cause a risk to any beneficial use of the aquatic environment	whole zone
Un-ionized ammonia	annual mean not to exceed 0.021 mg/L	whole zone
Nutrients	not to be present in quantities that cause excessive growth of algae or other aquatic plants	marine waters
	annual mean depth average inorganic nitrogen not to exceed 0.4 mg/L	marine waters

Table 1.3 Water Quality Objectives for Marine Waters of Victoria Harbour (Phase One) WCZ

Parameter	Objective	Part(s) of Zone
E. coli	annual geometric mean not to exceed 1000/100 ml	Inland waters
Dissolved Oxygen within 2 m of bottom	not less than 2 mg/L for 90% samples	marine waters
Depth averaged Dissolved Oxygen	not less than 4 mg/L for 90% samples	marine waters
	not less than 4 mg/L	Inland waters
pH value	within the range 6.5 to 8.5; change due to waste discharge not to exceed 0.2	marine waters
	within the range of 6.0 - 9.0	Inland waters
Salinity	change due to waste discharge not to exceed 10% of natural ambient level	whole zone
Temperature change	change due to waste discharge not to exceed 2 °C	whole zone
Suspended solids	waste discharge not to raise the natural ambient level by 30%, nor cause the accumulation of suspended solids which may adversely affect aquatic communities	marine waters
	annual median not to exceed 25 mg/L	Inland waters
Toxicants	not to be present at levels producing significant toxic effect, carcinogenic, mutagenic or teratonogenci effects in humans, fish or any other aquatic organisms, with due regard to biologically cumulative effects in food chains and to interactions of toxic substances with each other	whole zone
	not to cause a risk to any beneficial use of the aquatic environment	whole zone
Un-ionized ammonia	annual mean not to exceed 0.021 mg/L	whole zone
Nutrients	not to be present in quantities that cause excessive growth of algae or other aquatic plants	marine waters
	annual mean depth average inorganic nitrogen not to exceed 0.4 mg/L	marine waters

Table 1.4 Standards for Effluents Discharged Into Inshore Waters of Western Buffer WCZ

Flow rate (m^3/day) / Determinand	≤10	>10 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)	6-9	6-9	6-9	6-9	6-9	6-9	6-9	6-9	6-9	6-9	6-9	6-9
Temperature (°C)	40	40	40	40	40	40	40	40	40	40	40	40
Colour (lovibond units) (25 mm cell length)	1	1	1	1	1	1	1	1	1	1	1	1
Suspended solids	50	30	30	30	30	30	30	30	30	50	30	30
BOD	50	20	20	20	20	20	20	20	20	20	20	20
COD	100	80	80	80	80	80	80	80	80	80	80	80
Oil & Grease	30	20	20	20	20	20	20	20	20	20	20	10
Iron	15	10	10	7	5	4	3	2	1	1	0.8	0.6
Boron	5	4	3	2	2	1.5	1.1	0.8	0.5	0.4	0.3	0.2
Barium	5	4	3	2	2	1.5	1.1	0.8	0.5	0.4	0.3	0.2
Mercury	0.1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Cadmium	0.1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Other toxic metals individually	1	1	0.8	0.7	0.5	0.4	0.3	0.2	0.15	0.1	0.1	0.1
Total toxic metals	2	2	1.6	1.4	1	0.8	0.6	0.4	0.3	0.2	0.1	0.1
Cyanide	0.2	0.1	0.1	0.1	0.1	0.1	0.05	0.05	0.03	0.02	0.02	0.01
Phenols	0.5	0.5	0.5	0.3	0.25	0.2	0.1	0.1	0.1	0.1	0.1	0.1
Sulphide	5	5	5	5	5	5	2.5	2.5	1.5	1	1	0.5
Total residual chlorine	1	1	1	1	1	1	1	1	1	1	1	1
Total nitrogen	100	100	80	80	80	80	50	50	50	50	50	30
Total phosphorus	10	10	8	8	8	8	5	5	5	5	5	5
Surfactants (total)	20	15	15	15	15	15	10	10	10	10	10	10
E. coli (count/100 ml)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000

Note: All units in mg/L unless otherwise stated.

Source: EPD's *Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters* (Table 10a)

Table 1.5 Standards for Effluents Discharged Into Inshore Waters of Victoria Harbour (Phase One) WCZ

Determinand \ Flow rate (m^3/day)	≤10	>10 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)	6-9	6-9	6-9	6-9	6-9	6-9	6-9	6-9	6-9	6-9	6-9	6-9
Temperature (°C)	40	40	40	40	40	40	40	40	40	40	40	40
Colour (lovibond units) (25 mm cell length)	1	1	1	1	1	1	1	1	1	1	1	1
Suspended solids	50	30	30	30	30	30	30	30	30	50	30	30
BOD	50	20	20	20	20	20	20	20	20	20	20	20
COD	100	80	80	80	80	80	80	80	80	80	80	80
Oil & Grease	30	20	20	20	20	20	20	20	20	20	20	10
Iron	15	10	10	7	5	4	2.7	2	1.3	1	0.8	0.6
Boron	5	4	3	2.7	2	1.6	1.1	0.8	0.5	0.4	0.3	0.2
Barium	5	4	3	2.7	2	1.6	1.1	0.8	0.5	0.4	0.3	0.2
Mercury	0.1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Cadmium	0.1	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Other toxic metals individually	1	1	0.8	0.7	0.5	0.4	0.25	0.2	0.15	0.1	0.1	0.1
Total toxic metals	2	2	1.6	1.4	1	0.8	0.5	0.4	0.3	0.2	0.14	0.1
Cyanide	0.2	0.1	0.1	0.1	0.1	0.1	0.05	0.05	0.03	0.02	0.02	0.01
Phenols	0.5	0.5	0.5	0.3	0.25	0.2	0.13	0.1	0.1	0.1	0.1	0.1
Sulphide	5	5	5	5	5	5	2.5	2.5	1.5	1	1	0.5
Total residual chlorine	1	1	1	1	1	1	1	1	1	1	1	1
Total nitrogen	100	100	100	100	100	100	80	80	50	50	50	50
Total phosphorus	10	10	10	10	10	10	8	8	5	5	5	5
Surfactants (total)	20	15	15	15	15	15	10	10	10	10	10	10
E. coli (count/100 ml)	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000

Note: All units in mg/L unless otherwise stated.

Source: EPD's *Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters* (Table 9a)

Table 1.6 WSD Standards for Flushing Sea Water at Intake Point

Parameter (in mg L^{-1} unless otherwise stated)	WSD Flushing Target Limit
Colour (HU)	< 20
Turbidity (NTU)	< 10
Threshold Odour Number (odour unit)	< 100
Ammoniacal Nitrogen	< 1
Suspended Solids	< 10
Dissolved Oxygen	> 2
Biochemical Oxygen Demand	< 10
Synthetic Detergents	< 5
E. coli (no. / 100 ml)	< 20,000

1.3 Environmental Monitoring and Audit Requirements

1.3.1 The EIA study identified the likely environmental impacts during reclamation and construction phase, and these include noise, air quality and water quality. Their impact summary are given as follows:

Noise

1.3.2 Exceedances of the non-statutory day time limit of 75 dB(A) were predicted to occur at only five of the twelve selected representative NSRs (CN7, CN8, CN9, CN10 and CN11-ie Belvedere Gardens and Ng Kwok Wai Memorial Kindergarten). However, none of these NSRs would suffer exceedances for the entire duration of the reclamation works: Ng Kwok Wai Memorial Kindergarten would be affected by four construction noise phases, three NSRs at Belvedere Gardens would be affected by three construction phases, whilst one other NSR at Belvedere Gardens would only be affected by one construction phase. All exceedances would be due to four of seven identified phases of reclamation construction. With three exceptions, all predicted exceedances would be less than 5 dB(A). Noise levels predicted from the three remaining construction phases were predicted to comply with non-statutory limits at all NSRs.

1.3.3 Construction noise levels arising from reclamation road works were predicted to comply with non-statutory guidelines at all NSRs.

Air Quality

1.3.4 Results of the computer dispersion modelling on dust emissions showed that exceedance of the 1-hour average guideline level and the 24-hour average AQO for TSP at the sensitive receivers will not be expected with the implementation of sufficient dust suppression measures. Fifty percent dust reduction by twice daily watering with complete

coverage of active working areas was assumed in the assessment.

Water Quality

1.3.5 Major concerns relating to the water quality impact during the construction phase of the TWBFR are: phasing of reclamation, dredging and filling impact and polluted runoff during land based construction. The phasing of reclamation is scheduled in such a way that the potential formation of embayed water bodies will be minimised and polluted storm water will be diverted. With the sewerage improvement works currently being undertaken in Tsuen Wan, it is unlikely that there will be deterioration of water quality related to discharge of polluted waters into embayed area during the reclamation. Polluted runoff during land based development works on the reclamation would unlikely pose a great threat to the water quality provided that proper mitigation measures are provided and good site practices are implemented.

1.3.6 Dredging and filling impacts would be confined after a submerged seawall is built at the south reclamation boundary. The major concern would therefore be the impacts during the initial phase of short duration when the seawall has not been constructed. A worst case scenario is assumed for which sediment plume was modelled. Modelling results indicated that there would be potential impact of high elevations of suspended solids at intakes near TWB. It is recommended that this initial phase of the construction should be carried out in the dry season as planned and appropriate mitigation measures should be provided to minimise the impact at the intake. In case the works must be carried out in the wet season, it is recommended to reduce the number of plant and to stagger construction activities such that dredging of seawall foundation and filling of sand blanket will not be carried out on the same day.

1.3.7 If significant impact due to construction activities is identified at the intake, Contractor's working method and the proposed mitigation measures should be reviewed, and if necessary, works should be slowed down or suspended until such impact is reduced to an acceptable level. With the implementation of appropriate mitigation measures, water quality impacts at the intakes would however likely to be acceptable even if works are carried out in the wet season.

Conclusion

1.3.8 The noise, air quality and water quality impacts during the construction phase can be minimized to acceptable levels with the implementation of environmental mitigation measures. However, in order to ensure compliance with relevant standards, a requirement for baseline and compliance monitoring for noise, air and water quality has been identified. These requirements are detailed in subsequent sections of this Manual.

1.4 Project Organization

1.4.1 The proposed project organization and lines of communication with respect to environmental protection works are shown in **Figure 1.4**.

1.4.2 The ET leader shall be an independent party from the contractor and have relevant

professional qualifications, or have sufficient relevant EM&A experience subject to approval of the Engineer's Representative (ER) and the Environmental Protection Department (EPD).

1.4.3 The responsibility of respective parties are:

The Contractor:

- Employ an Environmental Team (ET) to undertake monitoring, laboratory analysis and reporting of environmental monitoring and audit;
- Provide assistance to ET in carrying out monitoring;
- Submit proposals on mitigation measures in case of exceedances of Action and Limit levels in accordance with the Event and Action Plans;
- Implement measures to reduce impact where Action and Limit levels are exceeded; and
- Adhere to the procedures for carrying out complaint investigation in accordance with 6.3.

Engineer or Engineer's Representative:

- Supervise the Contractor's activities and ensure that the requirements in the EM&A Manual are fully complied with;
- Inform the Contractor when action is required to reduce impacts in accordance with the Event and Action Plans;
- Employ an Independent Checker (Environment)(IC(E)) to audit the results of the EM&A works carried out by the ET; and
- Adhere to the procedures for carrying out complaint investigation in accordance with 6.3.

Environmental Team:

- Monitor the various environmental parameters as required in the EM&A Manual;
- Analyse the environmental monitoring and audit data and review the success of EM&A programme to cost effectively confirm the adequacy of mitigatory measures implemented and the validity of the EIA predictions and to identify any adverse environmental impacts arising;
- Carry out site inspection to investigate and audit the Contractors' site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and effect proactive action to pre-empt problems;

- Audit and prepare audit reports on the environmental monitoring data and site environmental conditions;

- Report on the environmental monitoring and audit results to the IC(E), Contractor, the ER and EPD or its delegated representative;

- Recommend suitable mitigation measures to the Contractor in the case of exceedance of Action and Limit levels in accordance with the Event and Action Plans; and

- Adhere to the procedures for carrying out complaint investigation in accordance with 6.3.

Independent Checker (Environment):

- Review the EM&A works performed by the ET;

- Audit the monitoring activities and results;

- Report the audit results to the ER and EPD in parallel;

- Review the EM&A reports submitted by the ET;

- Review the proposal on mitigation measures submitted by the Contractor in accordance with the Event and Action Plans; and

- Adhere to the procedures for carrying out complaint investigation in accordance with 6.3.

1.4.4 Sufficient and suitably qualified professional and technical staff shall be employed by the respective parties to ensure full compliance with their duties and responsibility, as required under the EM&A programme for the duration of the project.

1.5 Construction Programme

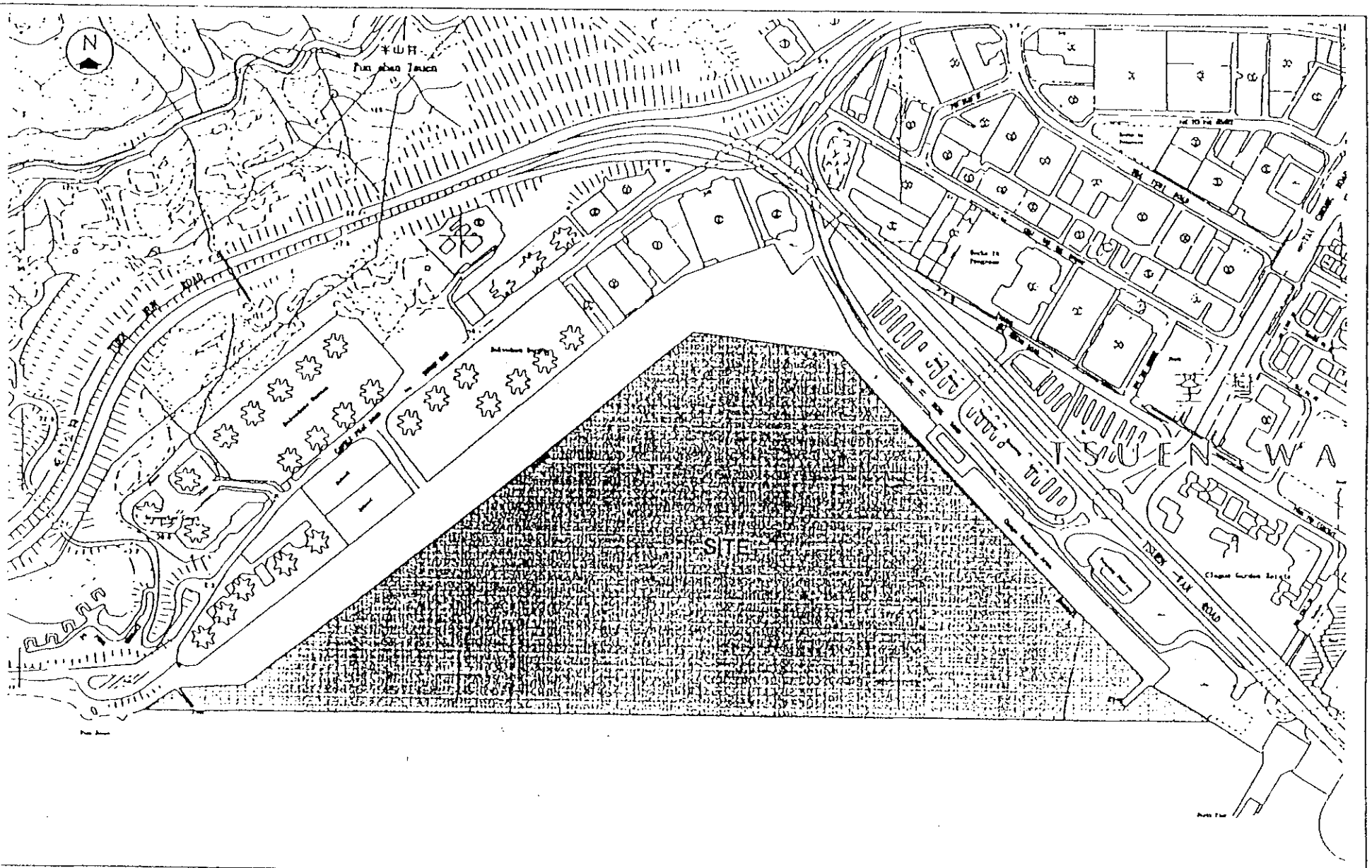
1.5.1 **Figure 1.5** shows the tentative programme for the TWB further reclamation work. Reclamation work would be carried out in four areas under five Phases. The programme is briefly summarised below.

- During the Phase I work, seawall foundation work would be carried out along the southern reclamation boundary. Dredging of marine mud would be confined along the seawall base and the seawall would be constructed to a height of about 4 m above the existing seabed elevation. Dumping of dredged marine mud and sandfilling activities within the reclamation site would also commence at this stage.

- Subsequently, the reclamation work would be undertaken in another four phases (Phases II to V). For each phase, dumping and sandfilling work would be confined to only part of the site area behind the submerged seawall following the

schedule shown in **Figures 1.6 - 1.10**; placement of surcharge and land development would commence after the dumping and sandfilling work in each phase is completed.

1.5.2 The ET Leader shall make reference to the actual works progress and programme during the construction stage to schedule the EM&A works, and the Contractor shall provide the respective information to the ET Leader for formulating the EM&A schedule. The Contractor shall also inform WSD before any dredging, filling or dumping activities are carried out near the intake at TWB.



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

THE STUDY AREA

FIGURE 1.1

SCALE NOT TO SCALE

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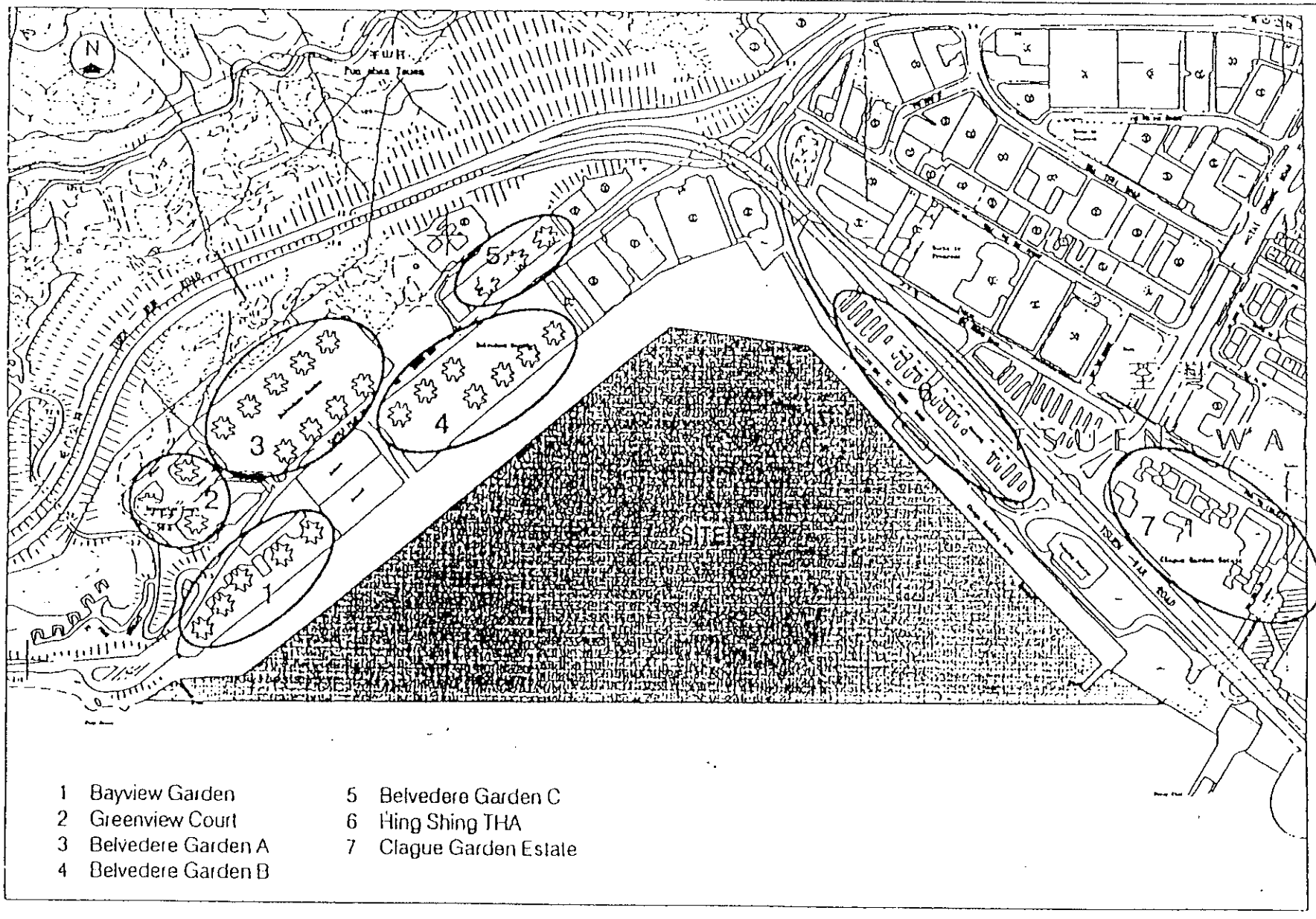


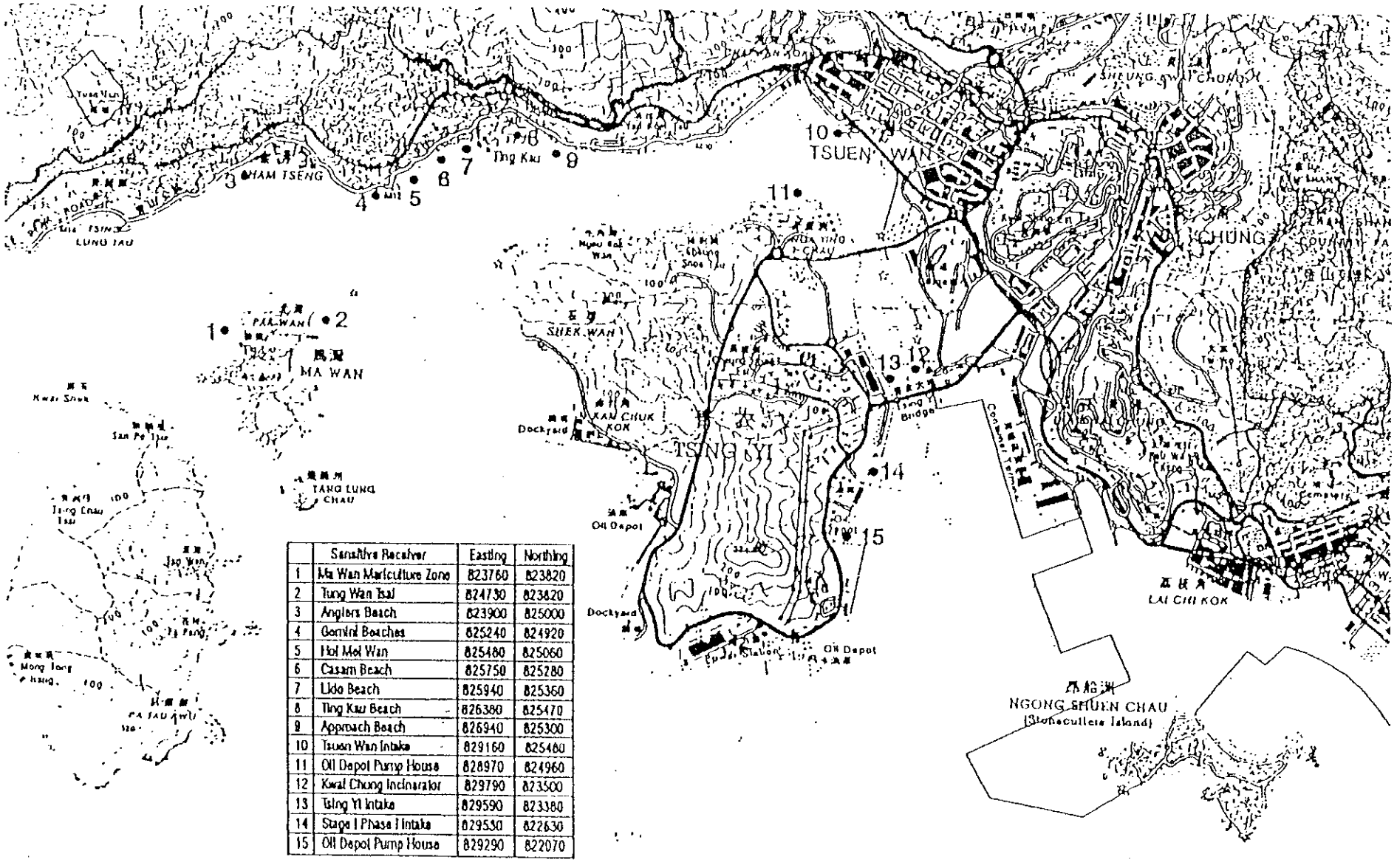
1 Bayview Garden
2 Greenview Court
3 Belvedere Garden A
4 Belvedere Garden B
5 Belvedere Garden C
6 Hing Shing THA
7 Clague Garden Estate

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

LOCATIONS OF EXISTING TERRESTRIAL SENSITIVE RECEIVERS

FIGURE 1.2

SCALE NOT TO SCALE



	Sensitive Receiver	Easting	Northing
1	Ma Wan Mariculture Zone	823760	823820
2	Tung Wan Tsai	824730	823820
3	Anglers Beach	823900	825000
4	Gemini Beaches	825240	824920
5	Hoi Mei Wan	825480	825060
6	Casam Beach	825750	825280
7	Lido Beach	825940	825360
8	Ting Kau Beach	826380	825470
9	Approach Beach	826940	825300
10	Tsuen Wan Intake	829160	825480
11	Oil Depot Pump House	828970	824960
12	Kwai Chung Incinerator	829790	823500
13	Tsing Yi Intake	829590	823380
14	Stage I Phase I Intake	829530	822630
15	Oil Depot Pump House	829290	822070

TSUEN WAN BAY FURTHER RECLAMATION, AREA35

LOCATIONS OF EXISTING MARINE SENSITIVE RECEIVERS

FIGURE 1.3

SCALE NOT TO SCALE

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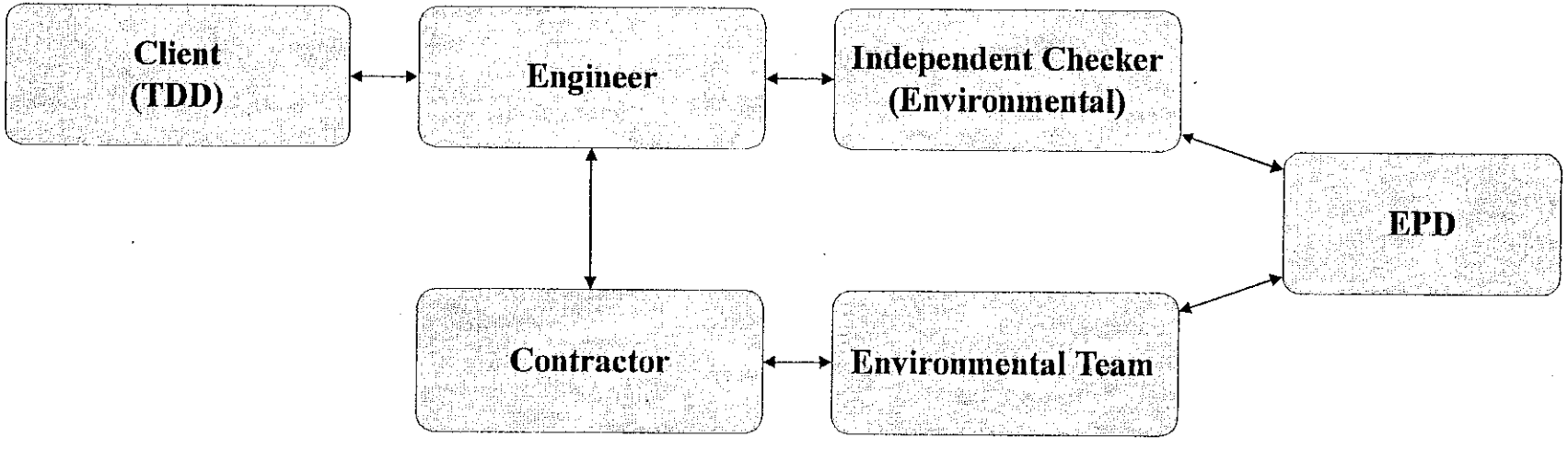
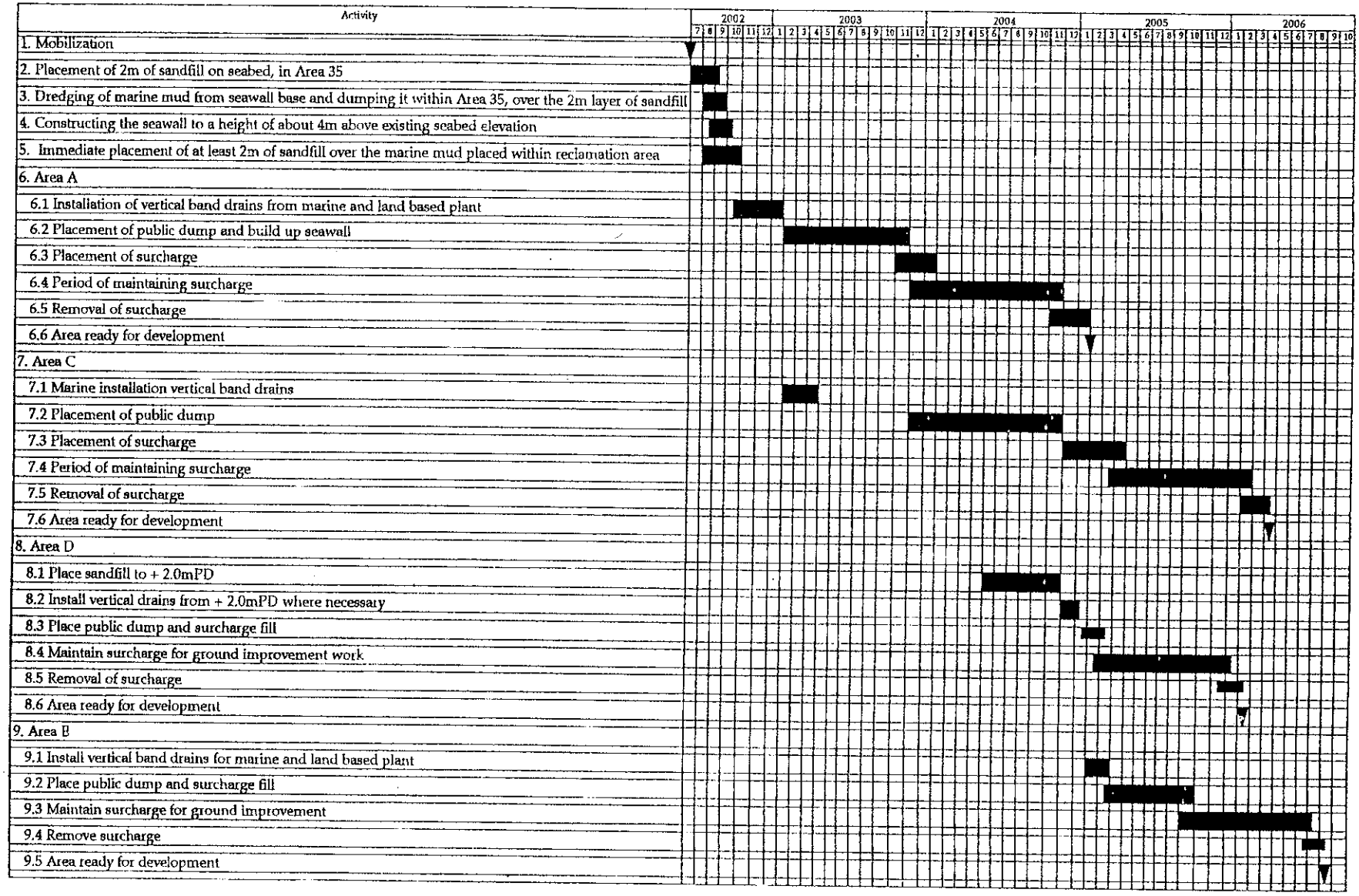


TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

PROJECT ORGANIZATION STRUCTURE

FIGURE 1.4

SCALE NOT TO SCALE

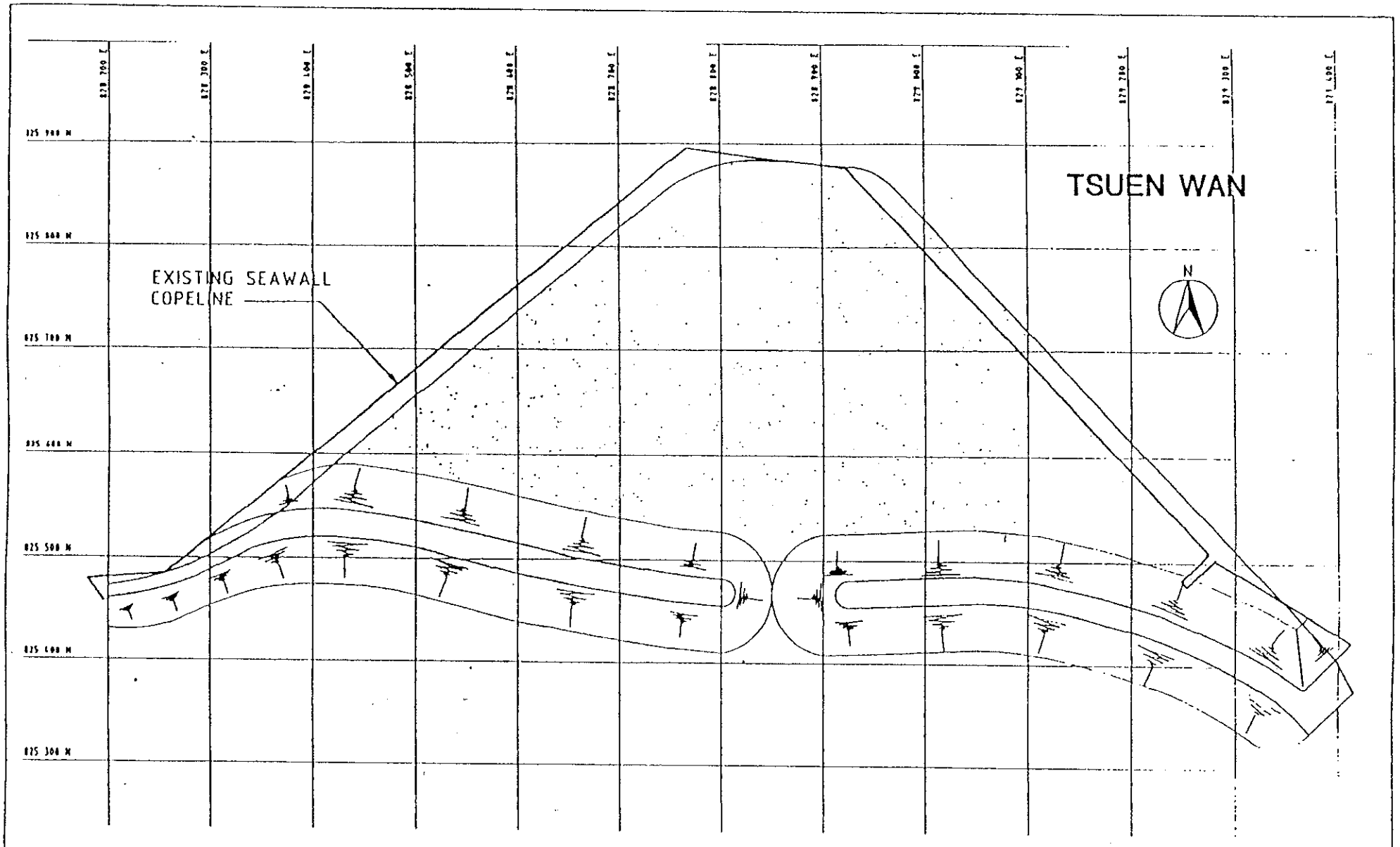


TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

TENTATIVE PROGRAM OF WORK FOR THE RECLAMATION

FIGURE 1.5

SCALE NOT TO SCALE



TSUEN WAN BAY FURTHER RECLAMATION, AREA35

PHASE I OF THE RECLAMATION CONSTRUCTION OF THE SEAWALL AND PLACEMENT OF 2m FILL

FIGURE 1.6

SCALE NOT TO SCALE

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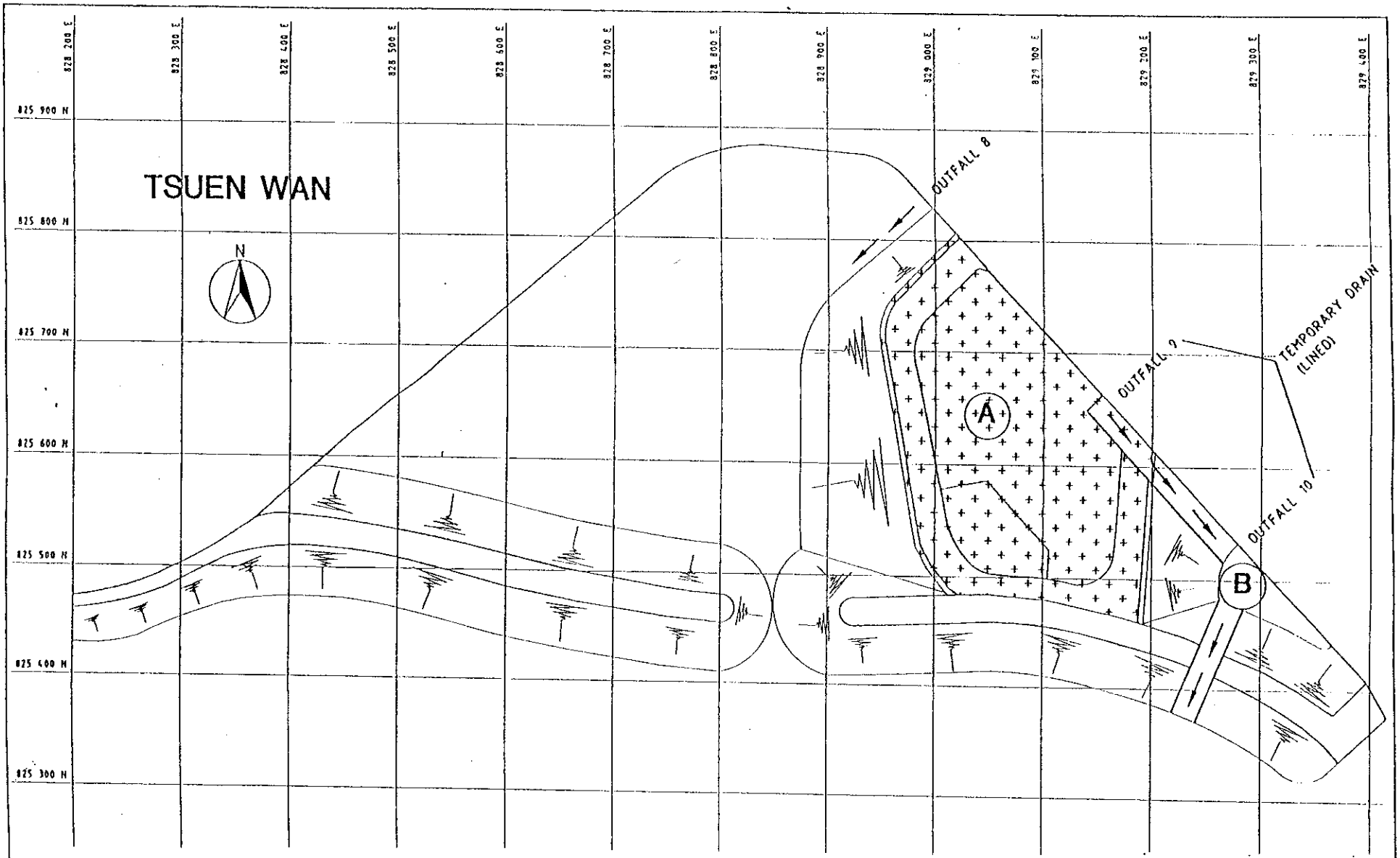
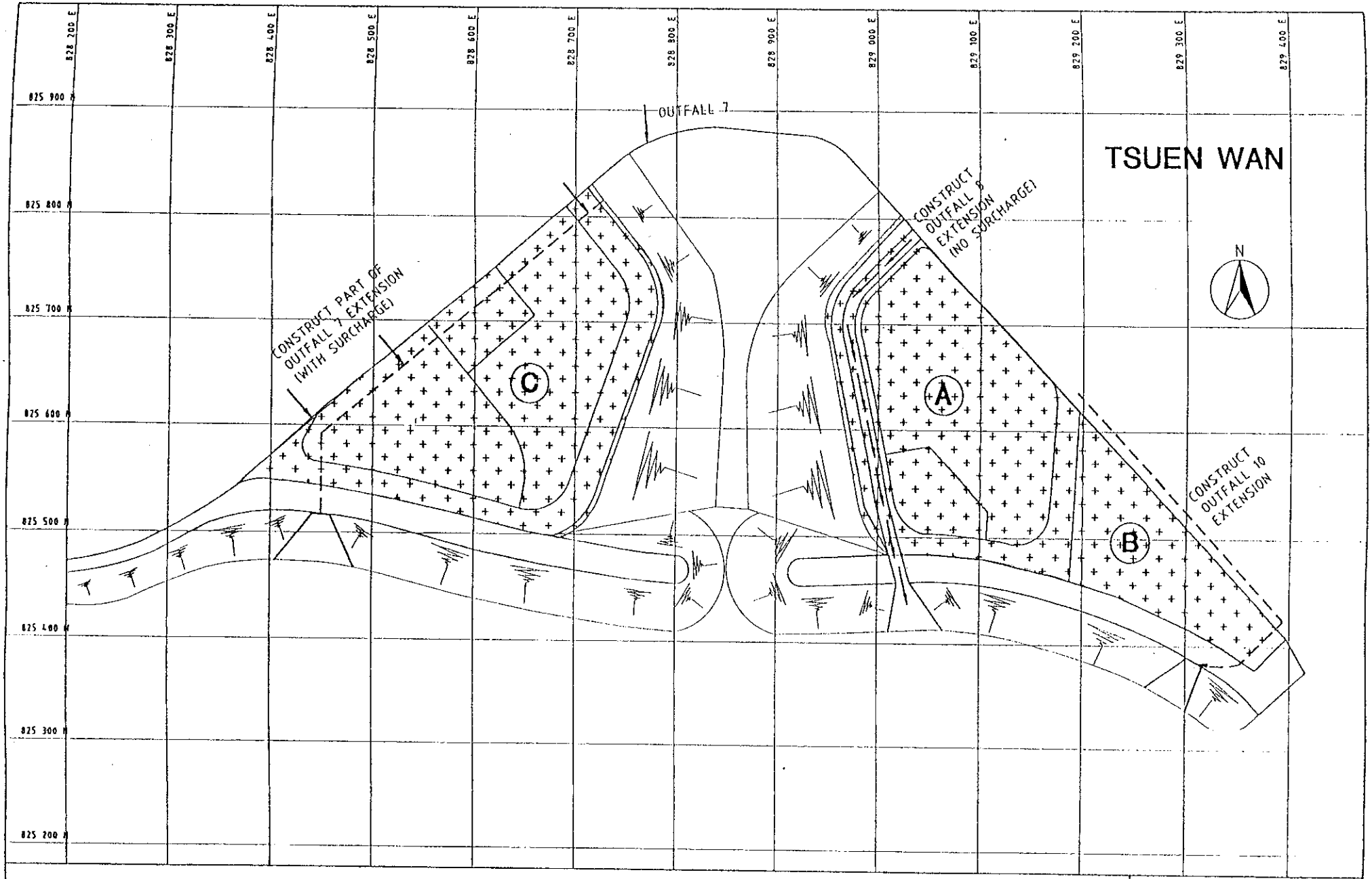


TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

PHASE II OF THE RECLAMATION AND TEMPORARY DRAINING DIVERSION

FIGURE 1.7

SCALE NOT TO SCALE

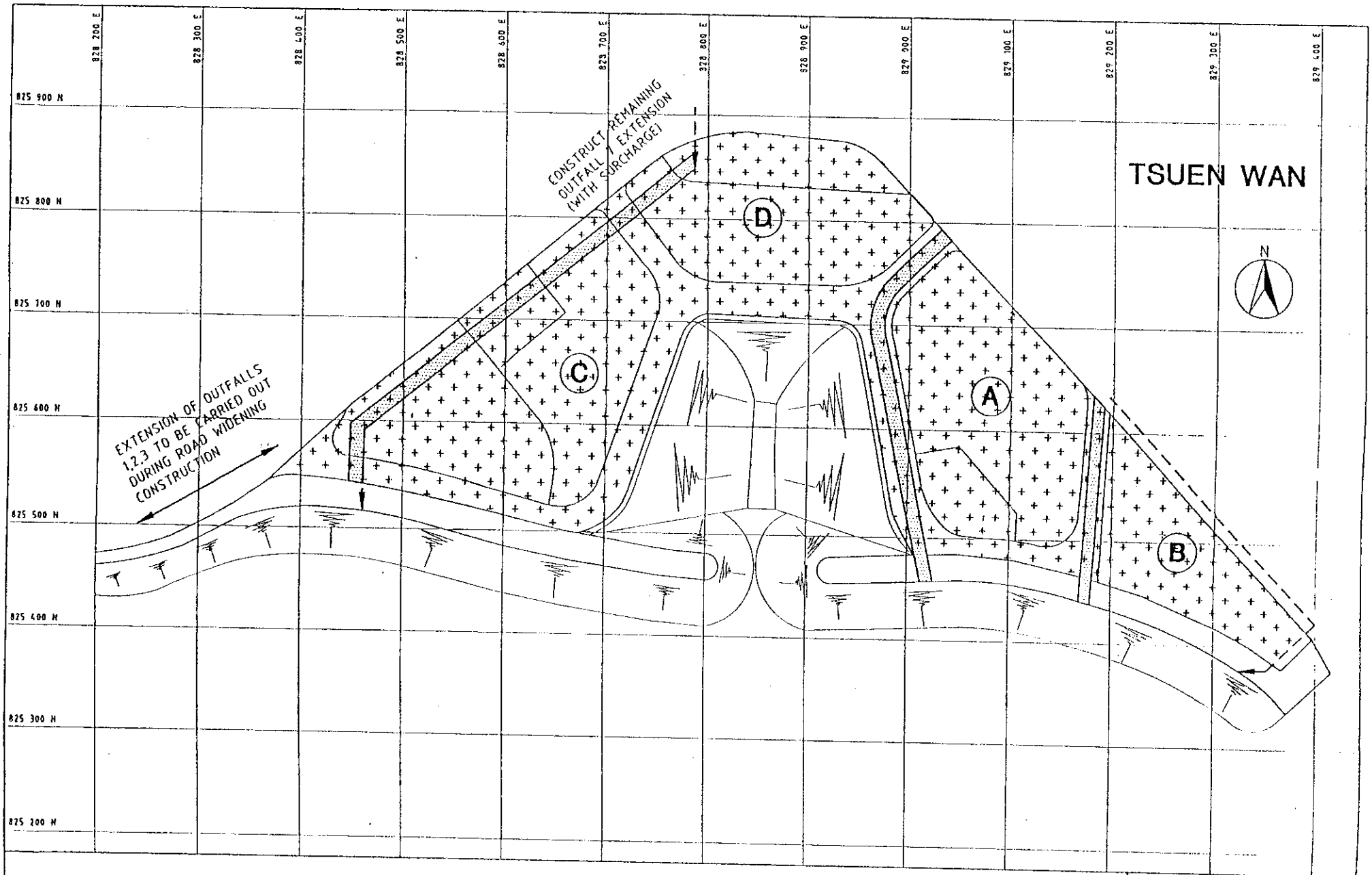


TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

PHASE III OF THE RECLAMATION TEMPORARY DRAINAGE DIVERSION

FIGURE 1.8

SCALE : 1 : 5000

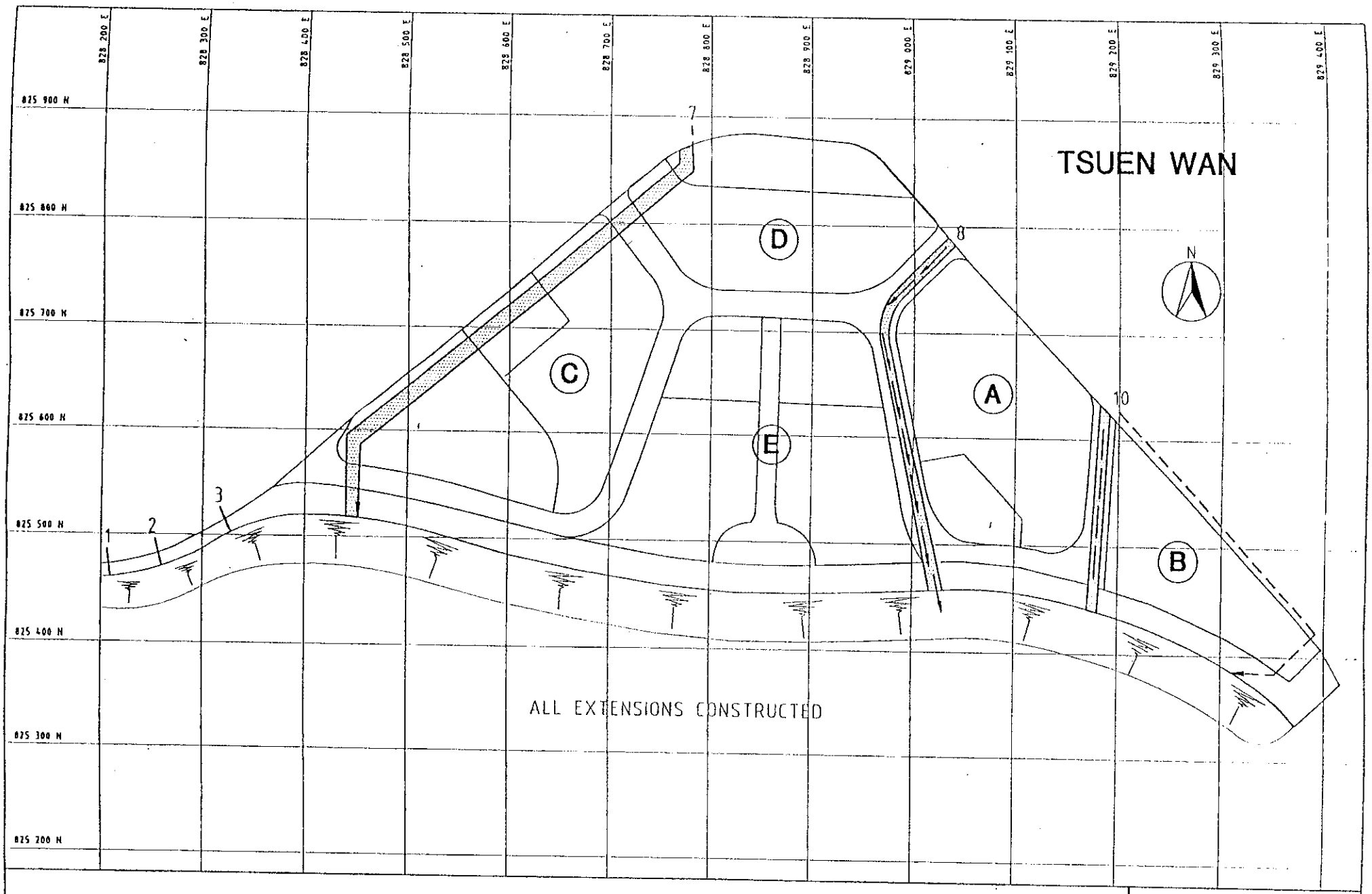


TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

PHASE IV OF THE RECLAMATION TEMPORARY DRAINAGE DIVERSION

FIGURE 1.9

SCALE : 1 : 5000



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

PHASE V OF THE RECLAMATION TEMPORARY DRAINAGE DIVERSION

FIGURE 1.10

SCALE : 1 : 5000

2 AIR QUALITY

2.1 Air Quality Parameters

2.1.1 Monitoring and audit of Total Suspended Particulates (TSP) levels shall be carried out by the ET to ensure that any deteriorating air quality will be quickly detected and timely action may be taken to rectify the situation.

2.1.2 1-hour and 24-hour TSP levels shall be measured to indicate any impacts of construction dust on air quality. The 24-hour TSP levels shall be measured in accordance with the high volume sampling method as set out in the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B. Upon approval by the ER, 1-hour TSP levels may be measured by direct reading methods capable of producing results comparable to the high volume sampling method, to indicate short event impacts.

2.1.3 All relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of the sampler, filter paper identification and weight, and any other local atmospheric factors affecting or affected by site conditions etc. shall be recorded down in detail. A sample monitoring record sheet is presented in **Attachment A**.

2.2 Monitoring Equipment

2.2.1 When using high volume samplers (HVSs) the sampling methodology shall be undertaken in compliance with the following specifications:

- 0.6-1.7 m^3/min (20-60 SCFM) adjustable flow range;
- equipped with a timing control device with +/- 5 minutes accuracy for 24 hours operation;
- installed with elapsed-time meter with +/- 2 minutes accuracy for 24 hours operation;
- capable of providing a minimum exposed area of 406 cm^2 (63 in^2);
- flow control accuracy: +/- 2.5% deviation over 24-hour sampling period;
- equipped with a shelter to protect the filter and sampler;
- incorporated with an electronic mass flow rate controller or other equivalent devices;
- equipped with a flow recorder for continuous monitoring;
- provided with a peaked roof inlet;
- incorporated with a manometer;

- able to hold and seal the filter paper to the sampler housing at horizontal position;
- easy to change the filter; and
- capable of operating continuously for 24-hour period.

2.2.2 The ET Leader shall be responsible for provision of the monitoring equipment. He shall ensure that sufficient number of HVSs with an appropriate calibration kit are available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. The HVSs shall be calibrated against a traceable standard at regular intervals. All equipment, calibration kits, filter papers, etc. shall be clearly labelled.

2.2.3 Initial calibration of dust monitoring equipment shall be conducted upon installation and thereafter at bi-monthly intervals. The transfer standard shall be traceable to the internationally recognised primary standard and be calibrated annually. The calibration data shall be properly documented for future reference by concerned parties such as the IC(E). All data shall be converted into standard temperature and pressure equivalents.

2.2.4 The sampler flow-rate shall be verified to be constant before and after the sampling exercise with the filter in position. Results shall be recorded in an appropriate data sheet (an example is given in **Attachment A**).

2.2.5 If the ET Leader proposes to use a direct reading dust meter to measure 1-hour TSP levels, he shall submit sufficient information to the IC(E) to prove the instrument is capable of achieving a comparable result to HVS machines. Any such instrument should be calibrated regularly, and 1-hour measurements shall also be determined periodically by HVS to check the validity and accuracy of the results measured by direct reading method.

2.2.6 Wind data monitoring equipment shall also be provided and set up at conspicuous locations near to dust monitoring locations for logging wind speed and wind direction. The location shall be proposed by the ET Leader and agreed with the ER in consultation with the IC(E). The following points shall be observed for the installation and operation of wind data monitoring equipment:

- wind sensors should be installed on masts elevated 10 m above ground so that they are clear of obstructions or turbulence caused by the buildings;
- wind data should be captured by a data logger and downloaded for processing at least once a month;
- wind data monitoring equipment should be re-calibrated at least once every six months; and
- wind direction should be divided into 16 sectors of 22.5 degrees each.

In exceptional situations, the ET Leader may propose alternative methods to obtain representative wind data upon approval from the ER and agreement with IC(E).

2.3 Laboratory Measurement / Analysis

2.3.1 A clean laboratory with constant temperature and humidity control shall be available for dust sample analysis, and this shall be equipped with the necessary measuring conditioning. Calibration instrumentation and maintenance facilities. The laboratory should be HOKLAS accredited.

2.3.2 If a site laboratory is set up or a non-HOKLAS accredited laboratory is retained for analysis, laboratory equipment shall be approved by the ER in consultation with the IC(E). Measurement performed by the laboratory shall be demonstrated to the satisfaction of the ER and the IC(E). IC(E) shall conduct regular audit to the measurement performed by the laboratory to ensure the accuracy of measurement results. The ET Leader shall provide the ER with one copy of the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), **Appendix B** for his reference.

2.3.3 Filter paper of size 8"x10" shall be labelled before sampling. It shall be a clean filter paper with no pin holes, and shall be conditioned in a humidity controlled chamber for over 24-hour and be pre-weighed before use.

2.3.4 Upon completion of sampling, the used filter paper shall be kept in a clean and tightly sealed plastic bag. The filter paper shall then be returned to the laboratory for reconditioning in the humidity controlled chamber followed by accurate weighing to 0.1 mg by an electronic balance. The balance shall be regularly calibrated against a traceable standard.

2.3.5 All collected samples shall be kept in good condition for six months prior to disposal.

2.4 Monitoring Locations

2.4.1 The monitoring locations are shown in **Figure 2.1**. The selection of final monitoring stations should take account of the following criteria, as far as practicable:

- it is preferable to monitor at the site boundary or locations close to the major dust emission source;
- locations should be in proximity to sensitive receivers; and
- prevailing meteorological conditions.

2.4.2 The ET Leader shall agree monitoring positions with the ER in consultation with the IC(E). When installing sampling equipment the following points shall be considered:

- a horizontal platform should be provided with appropriate support to secure samplers against gusty wind;
- no two samplers should be placed less than two metres apart;
- the distance between the sampler and any substantial structure must be equal to

at least twice the height that the structure protrudes above the sampler;

- a minimum of two metres separation from walls, parapets and penthouses is required for any rooftop samplers;
- a minimum of 2 metres separation from any supporting structure, measured horizontally is required;
- no furnace or incinerator should be located nearby;
- airflow should be unrestricted around the sampler;
- the sampler should be located more than 20 metres from any dripline;
- any wire fence and gate, required to protect the sampler, should not obstruct the monitoring process;
- permission must be obtained to set up and access samplers; and
- a secure and uninterrupted supply of electricity shall be provided.

2.5 Baseline Monitoring

2.5.1 Twenty-four hour TSP baseline monitoring shall be carried out at all designated monitoring locations for at least 14 consecutive days prior to the commissioning of the construction works. Before commencing the baseline monitoring, the ET leader shall inform the IC(E) of the baseline monitoring programme such that the IC(E) can conduct on-site audit to ensure accuracy of the baseline monitoring results.

2.5.2 No construction or dust generating activities should be underway during the baseline monitoring in the vicinity of the monitoring stations.

2.5.3 In the event that baseline monitoring cannot be carried out at the designated locations during the baseline monitoring period, representative alternative locations should be used. This shall only be undertaken with the approval of ER and in agreement with the IC(E).

2.5.4 Ambient conditions may vary seasonally and shall be reviewed at three monthly intervals. When ambient conditions have changed and baseline data requires updating monitoring should be undertaken at times when the contractor's activities are not generating dust, at least in the proximity of the monitoring stations. All revised baseline levels and air quality criteria should be agreed with the IC(E) and EPD.

2.6 Impact Monitoring

2.6.1 Impact monitoring should be carried out during reclamation and construction works. The sampling frequency shall be at least once every six days for 24-hour TSP monitoring. For 1-hour TSP monitoring, a sampling frequency of at least three times every six days shall be undertaken to coincide with the highest dust impacts. Before commencing the baseline

monitoring, the ET leader shall inform the IC(E) of the impact monitoring programme such that the IC(E) can conduct on-site audit to ensure accuracy of the impact monitoring results.

2.6.2 A specific and consistent start and stop time shall be clearly defined for each location and this shall be strictly followed by the operator for 24-hour TSP monitoring.

2.6.3 Within 24 hours for any non-compliance with the air quality criteria, more frequent monitoring shall be conducted within 24 hours after the result is obtained as specified in the Action Plan in *Section 2.7*. This additional monitoring shall continue until the excessive dust emissions subside, or the deterioration in air quality is rectified.

2.7 Event and Action Plan for Air Quality

2.7.1 Baseline monitoring results shall form the basis for determining Action and Limit levels for impact monitoring. **Table 2.1** shows air quality criteria. When any exceedance of Action and Limit levels occur, action must be undertaken to control environmental impacts to acceptable levels, as indicated in **Table 2.2**.

Table 2.1 Action and Limit Levels for Air Quality

Parameters	Action	Limit
24 Hour TSP Level, $\mu g/m^3$	For baseline level < 108 $\mu g/m^3$, Action level = average of baseline level plus 30% and Limit level For baseline level > 108 $\mu g/m^3$ and baseline level < 154 $\mu g/m^3$, Action level = 200 $\mu g/m^3$ For baseline level > 154 $\mu g/m^3$, Action level = 130% of baseline level	260 $\mu g/m^3$
1 Hour TSP Level, $\mu g/m^3$	For baseline level < 154 $\mu g/m^3$, Action level = average of baseline level plus 30% and Limit level For baseline level > 154 $\mu g/m^3$ and baseline level < 269 $\mu g/m^3$, Action level = 350 $\mu g/m^3$ For baseline level > 269 $\mu g/m^3$, Action level = 130% of baseline level	500 $\mu g/m^3$

Table 2.2 Event/Action Plan for Air Quality

EVENT	ACTION			
	ET	IC(E)	ER	CONTRACTOR
ACTION				
1. Exceedance for one sample	1. Identify source 2. Inform IC(E) and ER 3. Repeat measurement to confirm finding 4. Increase monitoring frequency to daily	1. Check monitoring data submitted by ET 2. Check Contractor's working method	1. Notify Contractor	1. Rectify any unacceptable practice 2. Amend working methods if appropriate
2. Exceedance for two or more consecutive samples	1. Identify source 2. Inform IC(E) and ER 3. Repeat measurements to confirm findings 4. Increase monitoring frequency to daily 5. Discuss with IC(E) and Contractor for remedial actions required 6. If exceedance continues, arrange meeting with IC(E) and ER 7. If exceedance stops, cease additional monitoring	1. Check monitoring data submitted by ET 2. Check Contractor's working method 3. Discuss with ET and Contractor on possible remedial measures 4. Advise the ER on the effectiveness of the proposed remedial measures 5. Supervisor implementation of remedial measures	1. Confirm receipt of notification of failure in writing 2. Notify Contractor 3. Ensure remedial actions properly implemented	1. Submit proposals for remedial actions to IC(E) within 3 working days of notification 2. Implement the agreed proposals 3. Amend proposal if appropriate
LIMIT LEVEL				
1. Exceedance for one sample	1. Identify source 2. Inform ER and EPD 3. Repeat measurement to confirm finding 4. Increase monitoring frequency to daily 5. Assess effectiveness of Contractor's remedial actions and keep IC(E), EPD and ER informed of the results	1. Check monitoring data submitted by ET 2. Check Contractor's working method 3. Discuss with ET and Contractor on possible remedial measures. 4. Advise the ER on the effectiveness of the proposed remedial measures 5. Supervisor implementation of remedial measures	1. Confirm receipt of notification of failure in writing 2. Notify Contractor 3. Ensure remedial actions properly implemented	1. Take immediate action to avoid further exceedance 2. Submit proposals for remedial actions to IC(E) within 3 working days of notification 3. Implement the agreed proposals 4. Amend proposal if appropriate
2. Exceedance for two or more consecutive samples	1. Notify IC(E), ER, Contractor and EPD 2. Identify source 3. Repeat measurement to confirm findings 4. Increase monitoring frequency to daily 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented 6. Arrange meeting with IC(E) and ER to discuss the remedial actions to be taken 7. Assess effectiveness of Contractor's remedial actions and keep IC(E), EPD and ER informed of the results 8. If exceedance stops, cease additional monitoring	1. Discuss amongst ER, ET, and Contractor on the potential remedial actions 2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly 3. Supervise implementation of remedial measures	1. Confirm receipt of notification of failure in writing 2. Notify Contractor 3. In consultation with the IC(E), agree with the Contractor on the remedial measures to be implemented 4. Ensure remedial measures properly implemented 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated	1. Take immediate action to avoid further exceedance 2. Submit proposals for remedial actions to IC(E) within 3 working days of notification 3. Implement the agreed proposals 4. Resubmit proposals if problem still not under control 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated

2.8 Mitigation Measures

2.8.1 In view of the potential high levels of dust arising from the construction activities of the project, it will be necessary to adopt control and mitigation measures wherever practicable. A commitment by the contractor to adopt good operational practices for dust minimisation should reduce the dust nuisance to a minimum. A number of practical measures are listed below:

- Use of regular watering to reduce dust emissions from exposed site surfaces and unpaved roads, at least twice daily with complete coverage, particularly during dry weather;
- Use of frequent watering for particularly dusty static construction areas and areas close to air quality sensitive receivers;
- Side enclosure and covering of any aggregate or dusty material storage piles to reduce emissions. Where this is not practicable owing to frequent usage, watering should be employed to aggregate fines;
- Open stockpiles should be avoided or covered. Where possible, prevent placing dusty material storage piles near air quality sensitive receivers;
- Provision of barriers, which may be the temporary noise barrier, between the site and nearby air quality sensitive receivers to act as dust barriers;
- Tarpaulin covering of all dusty vehicle loads transported to, from and between site locations;
- Establishment and use of vehicle wheel and body washing facilities at the exit points of the site, combined with cleaning of public roads where necessary;
- Provision of wind shield and dust extractor at the loading points and use of water sprinklers at the loading area;
- Imposition of speed controls for vehicles on unpaved site roads. Eight kilometres per hour is the recommended limit by EPD;
- Where feasible, routing of vehicles and positioning of construction plant should be at the maximum possible distance from air quality sensitive receivers; and
- Instigation of a control program to monitor the construction process in order to enforce controls and modify methods of work if dusty conditions arise.

2.8.2 Apart from the dust suppression measures listed above, the Contractor should also satisfy the requirements in *Air Pollution Control (Construction Dust) Regulation*.

2.8.3 In view of the potential odour impacts at the sensitive receivers during the construction periods, the following controls and mitigation measures should be undertaken where

practicable to reduce the odour impact to minimum level

2.8.4 We anticipate that most excavation will use grab dredging equipment. Mitigation for odour in respect to this equipment will include:

- Open stockpiles of the excavated material should be avoided or covered. Where possible, prevent odorous stockpiles near air quality sensitive receivers.

- Whenever the construction or maintenance program allows, dredging activities (normal dredging or suction dredging) should be undertaken during the cold season, when bioactivity and thus odorous gas production is low. Odour impacts to nearby sensitive receivers will thus be reduced.

2.8.5 In the unlikely event that suction dredging are used. Mitigation for odour in respect to this equipment will include:

- Dredged material should be pumped through a closed pipeline from the dredging point towards its destination. This will minimise odorous emissions due to resuspension and exposure of dredged material to the air.

- By injecting a solution of iron salts (or any other product able to eliminate production of hydrogen sulphide) into the closed pipeline, emission of hydrogen sulphide from the outlet of the pipeline will be reduced.

2.8.6 The Contractor shall be responsible for the design and implementation of these measures. If further measures are required to restore air quality to acceptable levels, these shall be implemented in liaison with the ET Leader and ER.

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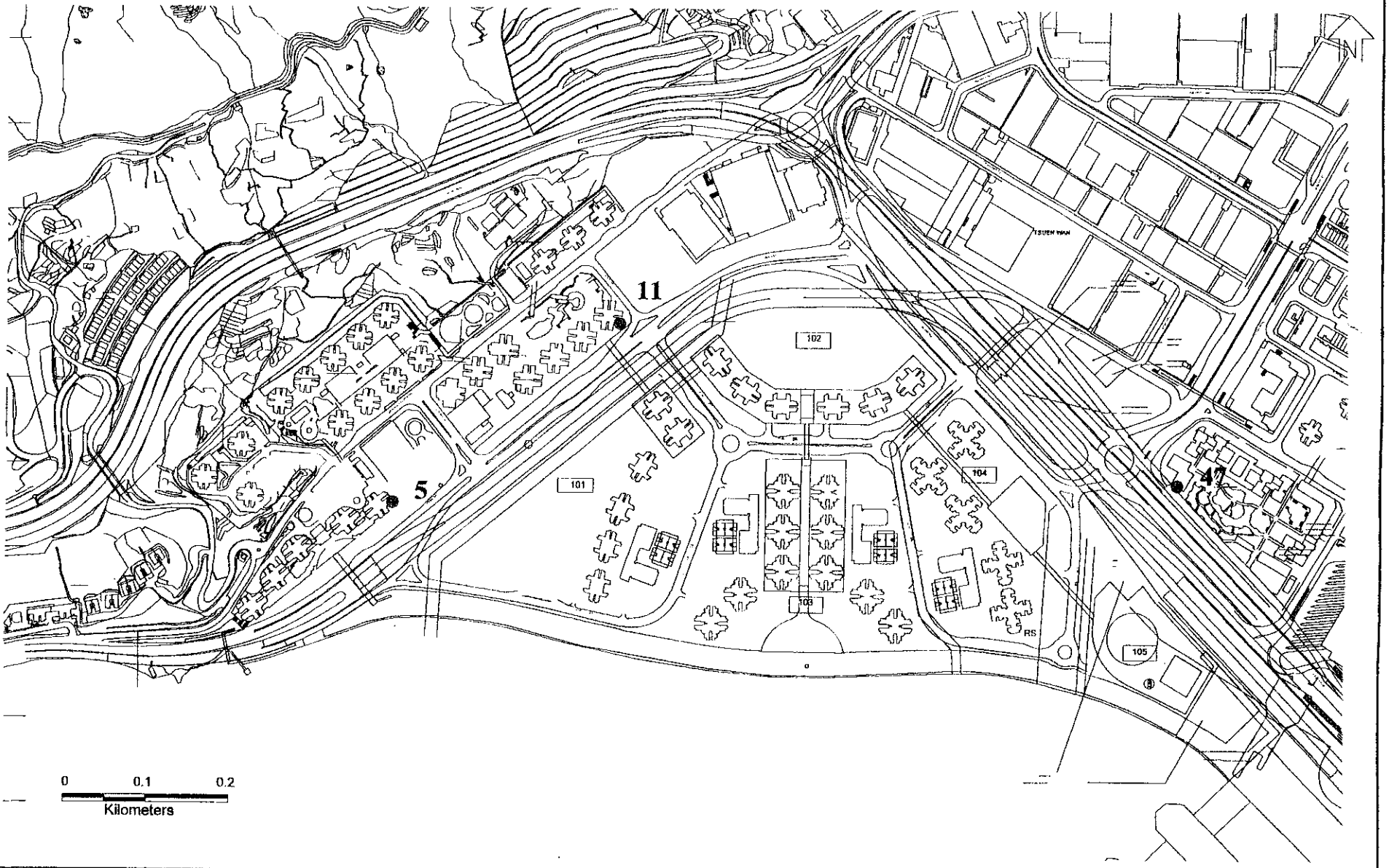


TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

AIR QUALITY MONITORING LOCATIONS

FIGURE	2.1
SCALE	1 : 6500

3 NOISE

3.1 Noise Parameters

3.1.1 Construction noise level shall be measured in terms of the A-weighted equivalent continuous sound pressure level (Leq). Leq(30 min) shall be used as the monitoring parameter for the time period between 0700-1900 hours on normal weekdays. For all other time periods, Leq(5 min) shall be employed for comparison with the NCO criteria.

3.1.2 As supplementary information for data auditing, statistical results such as L_{10} and L_{90} shall also be obtained for reference. A sample data record sheet is provided in **Attachment A**.

3.2 Monitoring Equipment

3.2.1 As referred to in the Technical Memorandum (TM) issued under the Noise Control Ordinance (NCO), sound level meters shall comply with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications. Immediately prior to and following each noise measurement the accuracy of the sound level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration level from before and after the noise measurement agree to within 1.0 dB.

3.2.2 Noise measurements should not be made in the presence of fog, rain, wind with a steady speed exceeding 5 m/s or wind with gusts exceeding 10 m/s. The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.

3.2.3 The ET Leader shall be responsible for the provision of monitoring equipment. He shall ensure that sufficient noise measuring equipment and associated instrumentation are available for carrying out baseline monitoring, regular impact monitoring and ad hoc monitoring. All equipment and associated instrumentation shall be clearly labelled.

3.3 Monitoring Locations

3.3.1 Monitoring shall, at least, be carried out at the most affected receiver. Recommended monitoring stations are shown in **Figure 3.1**. The final selection of monitoring locations should ensure that these are:

- at locations close to the major site activities likely to cause noise impacts;
- close to noise sensitive receivers (N.B. For the purposes of this section, any domestic premises, hotel, hostel, temporary housing accommodation, hospital, medical clinic, educational institution, place of public worship, library, court of law, performing art centre should be considered as noise sensitive receiver); and
- located such that disturbance to any occupants is minimized during monitoring.

3.3.2 The status and locations of noise sensitive receivers may change following the issue of this Manual. In such cases, the ET Leader shall propose updated monitoring locations and

seek approval from ER and agreement from the IC(E) and EPD.

3.3.3 Monitoring stations shall normally be at a point 1 m from the exterior of the sensitive receiver's building facade and at a position 1.2 m above the ground. If there is problem with access to the normal monitoring position, an alternative position may be chosen, and a correction to the measurements shall be made. For reference, a correction of +3 dB(A) shall be made to free field measurements. The ET Leader shall agree with the IC(E) all monitoring positions and corrections adopted. Once the positions for the monitoring stations are chosen, baseline monitoring and impact monitoring shall be carried out at the same positions.

3.4 Baseline Monitoring

3.4.1 The ET Leader shall carry out baseline noise monitoring prior to the commencement of any construction works. Baseline monitoring shall be carried out on a daily basis for a period of at least two weeks. A schedule for baseline monitoring shall be submitted to the ER for approval prior to commencement.

3.4.2 There shall not be any ongoing construction activities in the vicinity of the stations during the baseline monitoring.

3.4.3 Under certain circumstances, insufficient, or questionable, baseline monitoring data may be obtained in such cases the ET Leader shall liaise with IC(E) and EPD to agree on an appropriate data set for use as a baseline reference. These data shall also be submitted to the ER for approval.

3.4 Impact Monitoring

3.4.4 Noise monitoring shall be carried out at all designated stations. Monitoring frequency shall depend on the scale of the construction activities. However, the following is an initial guide on the regular monitoring frequency for each station on a per week basis when noise generating activities are underway:

(I) one set of measurements between 0700-1900 hours on normal weekdays;

(ii) one set of measurements between 1900-2300 hours;

(iii) one set of measurements between 2300-0700 hours of next day; and

(iv) one set of measurements between 0700-1900 hours on holidays (or Sunday).

3.4.5 It should be noted that noise monitoring should focus on (I) as construction work is understood to be restricted to normal weekdays between 0700-1900 hours. However, monitoring outside normal weekday periods should be undertaken as appropriate to the circumstances described in (ii), (iii) and (iv) should works take place during these periods. Requirements for such monitoring should be agreed between EPD, ET, IC(E) and ER prior to the commencement of works.

3.4.6 For the measurements (ii), (iii) and (iv) above, one set of measurements shall be considered to comprise at least 3 consecutive Leq(5 min) results.

3.4.7 In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Action Plan in Section 3.6 shall be carried out. This additional monitoring shall continue until recorded noise subsides to acceptable levels, or is proved unrelated to the construction activities.

3.5 Event and Action Plan for Noise

3.5.1 Action and Limit levels for construction noise are defined in **Table 3.1**. In the event of any non-compliance with these levels, action shall be carried out in accordance with the Action Plan in **Table 3.2**.

Table 3.1 Action and Limit Levels for Construction Noise

Time Period	Action	Limit
0700-1900 hours on normal weekdays	When one documented complaint is received	75* dB(A)
0700-2300 hours on holidays; and 1900-2300 hours on all other days		60/65/70** dB(A)
2300-0700 hours of next day		45/50/55** dB(A)

Notes: * dB(A) for schools and 65 dB(A) during school examination periods
** to be selected based on Area Sensitivity Rating agreed with EPD

Table 3.2 Event/Action Plan for Construction Noise

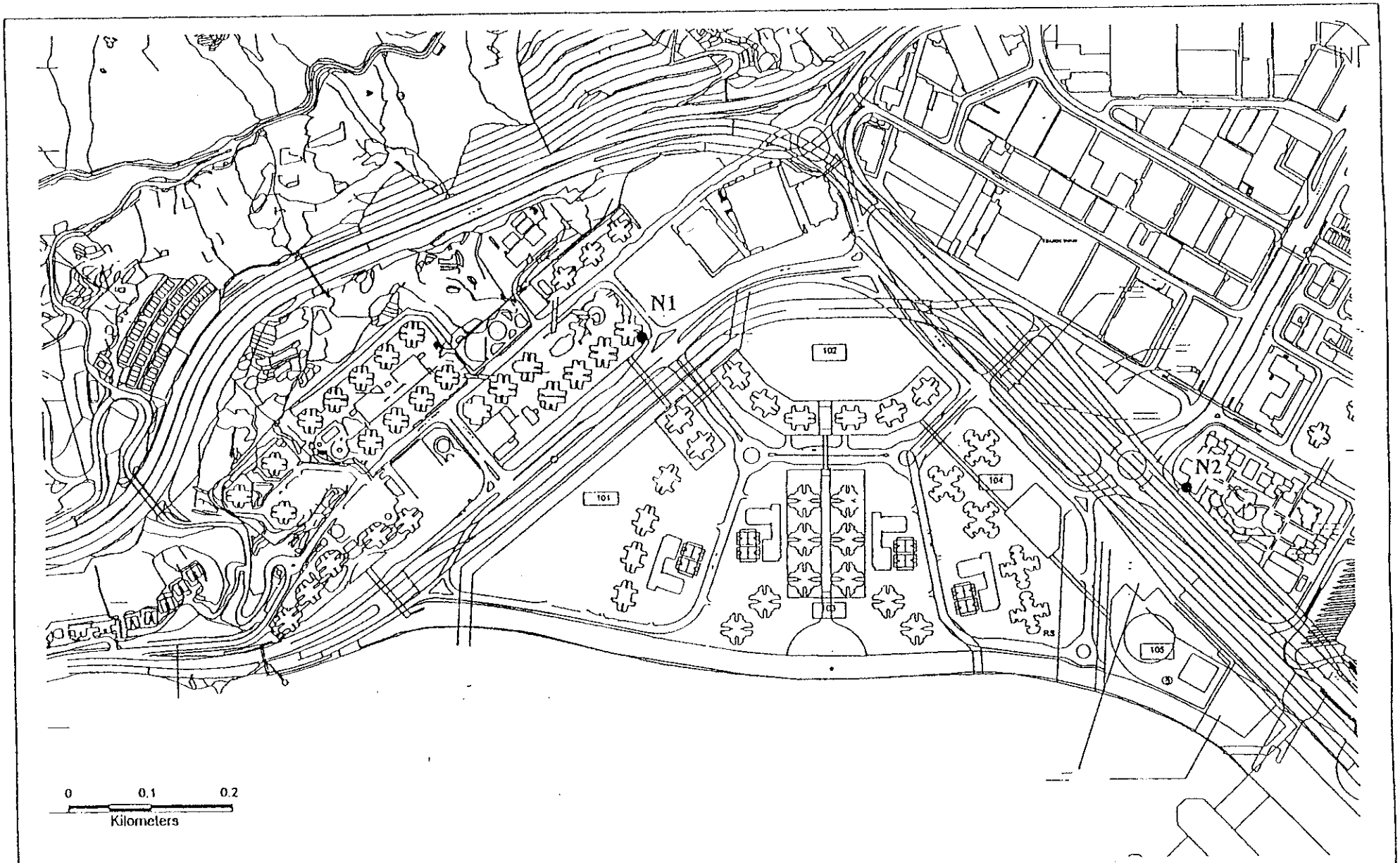
EVENT	ACTION			
	ET	IC(E)	ER	Contractor
Action Level	1. Notify IC(E) and Contractor 2. Carry out investigation 3. Report the results of investigation to the IC(E) and Contractor 4. Discuss with the Contractor and formulate remedial measures 5. Increase monitoring frequency to check mitigation effectiveness	1. Review the analysed results submitted by the ET 2. Review the proposed remedial measures by the Contractor and advise the ER accordingly 3. Supervise the implementation of remedial measures	1. Confirm receipt of notification of failure in writing 2. Notify Contractor 3. Require Contractor to propose remedial measures for the analysed noise problem 4. Ensure remedial measures are properly implemented	1. Submit noise mitigation proposals to IC(E) 2. Implement noise mitigation proposals
Limit Level	1, Notify IC(E), ER, EPD and Contractor 2. Identify source 3. Repeat measurement to confirm findings 4. Increase monitoring frequency 5. Carry out analysis of contractor's working procedures to determine possible mitigation to be implemented 6. Inform IC(E), ER and EPD the causes and actions taken for the exceedances 7. Assess effectiveness of Contractor's remedial actions and keep IC(E), EPD and ER informed of the results 8. If exceedance stops, cease additional monitoring	1, Discuss amongst ER, ET, and Contractor on the potential remedial actions 2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly 3. Supervise the implementation of remedial measures	1, Confirm receipt of notification of failure in writing 2. Notify Contractor 3. Require Contractor to propose remedial measures for the analysed noise problem 4. Ensure remedial measures are properly implemented 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated	1. Take immediate action to avoid further exceedance 2. Submit proposals for remedial actions to IC(E) within 3 working days of notification 3. Implement the agreed proposals 4. Resubmit proposals if problem still not under control 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated

3.6 Noise Mitigation Measures

3.6.1 The EIA report has recommended certain construction noise control and mitigation measures. The Contractor shall be responsible for the design and implementation of these measures. The key measures are:

- The contractor siting particularly noisy equipment and activities as far from sensitive receivers as is practical;
- Although the use of acoustic barriers would not generally be practical for reasons previously outlined, some limited benefit may still be achieved if temporary site offices or similar structures are located, as far as is possible, such that sensitive receivers are screened from the line of sight of the construction areas;
- Noisy plant or processes should be replaced by quieter alternatives where possible. For example, depending on the tasks involved, it may be possible to replace dump trucks with quieter lorries;
- Intermittent noisy activities should be scheduled to minimize the exposure of nearby NSRs to high levels of construction noise. For example, particularly noisy activities can be scheduled at times coinciding with periods when dwellings are more likely to remain unoccupied. Prolonged operation of noisy equipment close to dwellings should be avoided;
- Idle equipment should be turned off or throttled down. Noisy equipment should be properly maintained and used no more often than is necessary.
- With regard to individual tasks, construction activities should be planned so that parallel operation of several sets of equipment close to a given receiver is avoided;
- All construction plant should be properly maintained and operated. Construction equipment often has silencing measures built in or added on, e.g., bulldozer silencers, compressor panels, and mufflers. Silencing measures should be properly maintained and utilized; and
- The Contractor must check with the Ng Kwok Wai Memorial Kindergarten to ensure that noisy activities are kept to an absolute minimum during any examination periods.

3.6.2 If the above measures are not sufficient to restore noise to acceptable levels, upon the advice of ET Leader, the Contractor shall liaise with the ET Leader to propose and implement further mitigation. This shall be undertaken in agreement with the ER.



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

NOISE QUALITY MONITORING LOCATIONS

FIGURE 3.1

SCALE 1 : 6500

4 WATER QUALITY

4.1 Water Quality Parameters

4.1.1 As identified in the EIA Final Assessment Report, the critical stage of the reclamation work will be when both dredging and dumping of mud together with sand filling are concurrently, before the formation of the submerged seawall. Marine water monitoring shall be carried out during this critical period to ensure that any unacceptable increase in SS/turbidity and decrease in DO due to dredging, filling and dumping activities could be readily detected and timely action be taken to rectify the situation.

4.1.2 Dissolved oxygen (DO), turbidity and suspended solids (SS) levels shall be monitored at designated marine water quality monitoring stations during construction of seawall and other dredging, dumping and filling activities that will not be protected by the seawall. DO and turbidity should be measured *in-situ* whereas SS should be determined by laboratory.

4.1.3 Other relevant data shall also be recorded, such as: monitoring location/position, time, water depth, tidal stages, weather conditions and any special phenomena or work underway at the construction site. A sample monitoring record sheet is presented in **Attachment A** for ease of reference.

4.2 Monitoring Equipment

Dissolved Oxygen and Temperature Measuring Equipment

4.2.1 (I) The instrument should be a portable and weatherproof using a DC power source. It should have cables and sensor. The equipment should be capable of measuring:

- a DO level in the range of 0-20 mg/l and 0-200% saturation; and
- a temperature of 0-45 degree Celsius.

(ii) It should have a membrane electrode with automatic temperature compensation complete with a cable.

(iii) Should salinity compensation not be built-in in the DP equipment, *in-situ* salinity should be measured to calibrate the DO equipment prior to each DO measurement.

Turbidity Measurement Instrument

4.2.2 The instrument should be a portable and weatherproof using a DC power source. It should have a photoelectric sensor capable of measuring turbidity between 0-1000 NTU and be complete with a Hach model 2100P or an approved similar instrument.

Sampler

4.2.3 A water sampler is required. It should comprise a transparent PVC cylinder, with a capacity of not less than 2 litres, and can be effectively sealed with latex cups at both ends. The sampler should have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth (e.g. Kahlsico Water Sampler or an approved similar instrument).

Water Depth Detector

4.2.4 A portable, battery-operated echo sounder should be used for the determination of water depth at each designated monitoring station. This unit can either be hand held or affixed to the bottom of the work boat, if the same vessel is to be used throughout the monitoring programme.

Salinity

4.2.5 A portable salinometer capable of measuring salinity in the range of 0-40 part per thousand (ppt) should be provided for measuring salinity of the water at each monitoring location.

Sample Containers and Storage

4.2.6 (I) Water samples for SS determination should be stored in high density polythene bottles with no preservative added, packed in ice (cooled to 4°C without being frozen), delivered to the laboratory and analyzed as soon as possible after collection;

(ii) Water samples for oil & grease measurement should be stored in glass bottles, acidify to pH 2 or lower with 1:1 HCl, packed in ice (cooled to 4°C without being frozen), and delivered to the laboratory as soon as possible after collection.

Monitoring Position Equipment

4.2.7 A digital Differential Global Positioning System (DGPS) with way point bearing indication and Radio Technical Commission for maritime (RTCM) Type 16 error message 'screen pop-up' facilities (for real-time auto-display of error messages and DGPS corrections from the Hong Kong Hydrographic Office) or other equipment instrument of similar accuracy should be provided and used during marine water monitoring to ensure the monitoring vessel is at the correct location before taking measurements.

Calibration of In-Situ Instruments

4.2.8 The pH meter, DO meter and turbidimeter shall be checked and calibrated before use. DO meter and turbidimeter shall be certified by a laboratory accredited under HOKLAS or any other international accreditation scheme, and subsequently re-calibrated at 3 monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes should be checked with certified standard solutions before each use. Wet bulb

calibration for a DO meter shall be carried out before measurement at each monitoring location.

4.2.9 For the on site calibration of field equipment, the BS 127:1993, "Guide to Field and on-site test methods for the analysis of waters" should be observed.

4.2.10 Sufficient stocks of spare part shall be maintained for replacements when necessary. Backup monitoring equipment shall also be made available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration, etc.

4.3 Laboratory Measurement / Analysis

4.3.1 Duplicate samples from each independent sampling event are required by EPD for all parameters. Analysis of suspended solids shall be carried out in a HOKLAS or other international accredited laboratory. Water samples of about 1000 ml shall be collected at the monitoring stations for carrying out the laboratory SS determination. The detection limit shall be 1 mg/l or better. The SS determination work shall start within 24 hours after collection of the water samples. The SS determination shall follow APHA 19ed 2540D or equivalent methods subject to approval of EPD.

4.3.2 If a site laboratory is set up or a non-HOKLAS and non-international accredited laboratory is hired for carrying out the laboratory analysis, the laboratory equipment, analytical procedures, and quality control shall be approved by EPD. All the analysis shall be witnessed by the ER. The ET Leader shall provide the ER with one copy of the relevant chapters of the "APHA Standard Methods for the Examination of Water and Wastewater" 19th edition and any other relevant document for his reference.

4.3.3 Additional duplicate samples may be required by EPD for inter laboratory calibration. Remaining samples after analysis shall be kept by the laboratory for 3 months in case repeat analysis is required. In any circumstance, the sample testing shall have comprehensive quality assurance and quality control programmes. The laboratory shall prepare to demonstrate the programmes to EPD or his representatives when requested..

4.4 Monitoring Locations

4.4.1 Marine water quality monitoring stations during reclamation are shown in **Figure 4.1**. These stations are chosen based on the following criteria:

(I) At locations close to and preferably at the boundary of the major site activities as indicated in the EIA final report, which are likely to have water quality impacts;

(ii) Close to the sensitive receptors which are directly or likely to be affected;

(iii) For monitoring locations located in the vicinity of the sensitive receptors, care should be taken to cause minimal disturbance during monitoring; and

(iv) two or more control stations which shall be at locations representative of the project site in its undisturbed condition. Control stations should be located, as far

as is practicable, both upstream and down stream of the works area.

4.4.2 The status and locations of water quality sensitive receivers and the marine activities sites may change after issuing this manual. If such cases exist, the ET Leader shall propose updated monitoring locations and seek approval from the IC(E) and EPD.

4.4.3 Control stations are necessary to compare the water quality from potentially impacted sites with the ambient water quality. Control stations shall be located within the same body of water as the impact monitoring stations but should be outside the area of influence of the works and, as far as practicable, not affected by any other works.

4.4.4 Measurements shall be taken at 3 water depths, namely, 1 m below water surface, mid-depth and 1 m above sea bed, except where the water depth less than 6 m, the mid-depth station may be omitted. Should the water depth be less than 3 m, only the mid-depth station will be monitored. The ET Leader shall seek approval from IC(E) and EPD on all the monitoring stations.

4.5 Baseline Monitoring

4.5.1 Baseline conditions for marine water quality shall be established and agreed with EPD prior to the commencement of works. The purposes of the baseline monitoring are to establish ambient conditions prior to the commencement of the works and to demonstrate the suitability of the proposed impact, control and reference monitoring stations. The baseline conditions shall normally be established by measuring the water quality parameters specified in *Section 4.1*. The measurements shall be taken at all designated monitoring stations including control stations, 3 days per week, at mid-flood and mid-ebb tides, for at least four weeks prior to the commencement of marine works.

4.5.2 There shall not be any marine construction activities in the vicinity of the stations during the baseline monitoring.

4.5.3 In exceptional case when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall seek approval from the IC(E) and EPD on an appropriate set of data to be used as baseline reference.

4.5.4 Baseline monitoring schedule shall be faxed to EPD one week prior to the commencement of baseline monitoring. The interval between 2 sets of monitoring shall not less than thirty-six hours.

4.6 Impact Monitoring

4.6.1 Construction of the submerged seawall at the southern edge of the reclamation would be the most critical stage in terms of water quality impacts. During this critical period, monitoring shall be undertaken three times per week, at mid-flood and mid-ebb tides, with sampling/measurement at the designated monitoring stations. The interval between two sets of monitoring shall not be less than 36 hours except where there are exceedances of Action and/or Limit levels, in which case the monitoring frequency will be increased.

4.6.2 Additional daily surface layer measurement of SS and turbidity should also be undertaken at the WSD seawater intake to closely monitor the water quality. Monitoring results shall be faxed to WSD for information.

4.6.3 It is recommended that the monitoring work shall continue until the seawall at the southern edge of the site is built above the sea level. Upon completion of the seawall, a post monitoring exercise on water quality shall be carried out for at least four weeks in the same manner as the impact monitoring. The monitoring work would be suspended if the post monitoring work reveals that there is no adverse impact arising from the public dumping activities.

4.6.4 Proposed water quality monitoring schedule shall be faxed to EPD on or before the first day of the monitoring month. EPD shall also be notified immediately for any changes in schedule by fax.

4.7 Event and Action Plan for Marine Water Quality

4.7.1 Marine water quality criteria, namely Action and Limit levels, are shown in **Table 4.1**. These criteria should be applied to ensure that any deteriorating water quality could be readily detected. When the monitoring results of the water quality parameters at any designated monitoring stations exceed the water quality criteria, the actions in accordance with the Action Plan in **Table 4.2** shall be carried out.

Table 4.1 Action and Limit Levels for Marine Water Quality

Parameters	Action	Limit
DO in mg/l (Surface, Middle & Bottom)	Surface & Middle 5%-ile of baseline data for surface and middle layer Bottom 5%-ile of baseline data for bottom layer	Surface & Middle 4 mg/l or 1%-ile of baseline data for surface and middle layer Bottom 2 mg/l or 1%-ile of baseline data for bottom layer
SS in mg/l (depth-averaged)	95%-ile of baseline data or 120% of upstream control station's turbidity at the same tide of the same day	99%-ile of baseline or 130% of upstream control station's SS at the same tide of the same day and specific sensitive receiver water quality requirements (e.g. required suspended solids level for concerned sea water intakes)
Turbidity in NTU (depth-averaged)	95%-ile of baseline data and 120% of upstream control station's SS at the same tide of the same day	99%-ile of baseline or 130% of upstream control station's Turbidity at the same tide of the same day
SS in mg/l (surface layer at station W4, close to WSD seawater intake)	10	20

Notes:
1 "depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.
2 For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
3 For turbidity, SS, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
4 All the figures given in the table are used for reference only and the EPD may amend the figures whenever it is considered as necessary.

Table 4.2 Event and Action Plan for Marine Water Quality

Event	ET Leader	IC(E)	ER	Contractor
Action level being exceeded by one sampling day	Repeat *in-situ* measurement on next day of exceedance to confirm findings; Identify source(s) of impact; Inform IC(E), contractor and ER; Check monitoring data, all plant, equipment and Contractor's working methods. If exceedance occurs at Station W4: Inform WSD; Check whether the results exceed 120% of upstream control station's SS at the same tide of the same day [A].	Check monitoring data submitted by ET and Contractor's working methods.	Confirm receipt of notification of failure in writing; Notify Contractor.	Inform the ER and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Amend working methods if appropriate.
Action level being exceeded by two or more consecutive sampling days	Repeat measurement on next day of exceedance to confirm findings; Identify source(s) of impact; Inform IC(E), contractor and ER; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IC(E), ER and Contractor; Ensure mitigation measures are implemented; Increase the monitoring frequency to daily until no exceedance of Action level. If exceedance occurs at Station W4: Inform WSD; Check whether the results exceed 120% of upstream control station's SS at the same tide of the same day [A].	Check monitoring data submitted by ET and Contractor's working method; Discuss with ET and Contractor on possible remedial actions; Review the proposed mitigation measures submitted by Contractor and advise the ER accordingly; Supervise the implementation of mitigation measures.	Discuss with IC(E) on the proposed mitigation measures; Ensure mitigation measures are properly implemented; Assess the effectiveness of the implemented mitigation measures.	Inform the Engineer and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment and consider changes of working methods; Submit proposal of mitigation measures to ER within 3 working days of notification and discuss with ET, IC(E) and ER; Implement the agreed mitigation measures.
Limit level being exceeded by one sampling day	Repeat measurement on next day of exceedance to confirm findings; Identify source(s) of impact; Inform IC(E), contractor, ER and EPD; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IC(E), ER and Contractor. If exceedance occurs at Station W4: Inform WSD; Check whether the results exceed 130% of upstream control station's SS at the same tide of the same day [B].	Check monitoring data submitted by ET and Contractor's working method; Discuss with ET and Contractor on possible remedial actions; Review the proposed mitigation measures submitted by Contractor and advise the ER accordingly.	Confirm receipt of notification of failure in writing; Discuss with IC(E), ET and Contractor on the proposed mitigation measures; Request Contractor to review the working methods.	Inform the ER and confirm notification of the non-compliance in writing; Rectify unacceptable practice; Check all plant and equipment and consider changes of working methods; Submit proposal of mitigation measures to ER within 3 working days of notification and discuss with ET, IC(E) and ER;

Notes: A If the monitoring results at Station W4 exceed 120% of upstream control station's SS, corresponding action listed in the action plan should be taken immediately. Working schedule and mitigation measures should also be discussed amongst the Contractor, the IC(E), the ER and the ET, and if necessary, works should be slowed down or suspended until no exceedances are identified at the intake. Otherwise, no action is considered necessary.

B If the monitoring results at Station W4 exceed 130% of upstream control station's SS, corresponding action listed in the action plan should be taken immediately. Working schedule and mitigation measures should also be discussed amongst the Contractor, the IC(E), the ER and the ET, and if necessary, works should be slowed down or suspended until no exceedances are identified at the intake. Otherwise, no action is considered necessary.

Table 4.2 Event and Action Plan for Marine Water Quality (Continued)

Event	ET Leader	IC(E)	ER	Contractor
Limit level being exceeded by two or more consecutive sampling days	Repeat measurement on next day of exceedance to confirm findings; Identify source(s) of impact; Inform IC(E), contractor, ER and EPD; Check monitoring data, all plant, equipment and Contractor's working methods; Discuss mitigation measures with IC(E), ER and Contractor; Ensure mitigation measures are implemented; Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days. If exceedance occurs at Station W4: Inform WSD; Check whether the results exceed 130% of upstream control station's SS at the same tide of the same day[B].	Check monitoring data submitted by ET and Contractor's working method; Discuss with ET and Contractor on possible remedial actions; Review the Contractor's mitigation measures whenever necessary to assure their effectiveness and advise the ER accordingly; Supervise the implementation of mitigation measures.	Discuss with IC(E), ET and Contractor on the proposed mitigation measures; Request Contractor to critically review the working methods; Make agreement on the mitigation measures to be implemented; Ensure mitigation measures are properly implemented; Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the construction activities until no exceedance of Limit level.	Take immediate action to avoid further exceedance; Submit proposal of mitigation measures to ER within 3 working days of notification and discuss with ET, IC(E) and ER; Implement the agreed mitigation measures; Resubmit proposals of mitigation measures if problem still not under control; As directed by the Engineer, to slow down or to stop all or part of the construction activities until no exceedance of Limit level.

Notes: B - If the monitoring results at Station W4 exceed 130% of upstream control station's SS, corresponding action listed in the action plan should be taken immediately. Working schedule and mitigation measures should also be discussed amongst the Contractor, the IC(E), the ER and the ET, and if necessary, works should be slowed down or suspended until no exceedances are identified at the intake. Otherwise, no action is considered necessary.

4.8 Water Quality Mitigation Measures

Introduction

4.8.1 Mitigation measures for dredging, dumping and land construction activities are summarised below. If the below measures are not sufficient to restore the water quality to an acceptable levels upon the advice of the ET Leader, the Contractor shall liaise with the ET Leader on some other mitigation measures, propose to IC(E) and ER for approval, and carry out the mitigation measures.

Mitigation During Dredging

4.8.2 Although dredging impacts have been predicted to be acceptable except during a short duration in phase I reclamation, dredging and filling works should be carried out in a controlled manner such that release of sediments into the marine environment would be reduced. The following list of measures should be observed and followed:

- Properly maintained closed mechanical grabs should be used to minimise spillage and should seal tightly while being lifted;
- The decks of all vessels should be kept tidy and free of oil or other substances that might be accidentally or otherwise washed overboard;
- Loading of barges and hoppers should be controlled to prevent splashing of dredged materials to the surrounding environment and barges and hoppers should under no circumstances be filled to a level which would cause overflowing of material or sediment laden waters during loading and transportation;
- Silt screens should be provided at the following intakes: WSD Tsuen Wan Saltwater Intake, KCRC Temporal Intake, the Kwai Chung Incinerator Intake and Oil Depot Pump House North Intake during marine construction work;
- Silt curtains should be in place during dredging and filling works to minimise the dispersion of sediment plume;
- The critical activities during phase I, construction of the seawall foundation, should be scheduled to be carried out in the dry season when predicted impacts are less significant; and
- If monitoring results indicated that the reclamation activities caused a significant impact to the sensitive receivers, in particular the WSD intake at TWB, construction programmes should be scheduled carefully to stagger construction activities such that dredging of seawall foundation and filling of sand blanket will not be carried out on the same day. It is also recommended to reduce the number of plants if possible. The working schedule and the mitigation measures should be reviewed by the Contractor, the IC(E), the ET Leader and the ER, and if necessary, works should be slowed down or suspended until such impact is reduced to an acceptable level.

4.8.3 The above mitigation measures should also be adopted for dumping of contaminated sediments where appropriate. Placement of contaminated sediments should be carried out carefully by closed grabs to minimise escape of contaminants. Proper site management and debris collection programme should be set up to avoid environmental problems due floating debris from the public dump activities.

4.8.4 It is recommended that the rates of dredging, filling and dumping activities should not exceed the worst case scenario assumed for the sediment plume modelling, as follows:

- The maximum dredging rate of marine mud should not exceed 7,500 m^3 per day;
- The maximum dumping rate of marine mud should not exceed 7,500 m^3 per day;
- The maximum filling rate of the sand blanket on top of the existing seabed should not exceed 4,500 m^3 per day; and
- The maximum filling rate of the sand capping on top of the dredged mud placed in the site should not exceed 9,000 m^3 per day.

4.8.5 Recommendations for public dumping activities include:

- The eastern seawall should be completed to +4.5 m.P.D. prior to the commencement of public dumping in Area A and B;
- The western seawall (about 450 m in length) should be completed to +4.5 m.P.D. prior to the commencement of public dumping in Area C' and
- Floating refuse collection programme should be set up to prevent floating refuse from leaving the site.

Mitigation for Land Construction

4.8.6 With the sewerage improvement works currently being undertaken in Tsuen Wan, it is unlikely that there will be deterioration of water quality related to discharge of polluted waters into embayed area during the reclamation. However, it would be prudent to have diversion of storm drains carried out at early stages. The flow diversion work in relation to the reclamation phasing should follow the sequence and timing indicated in Figures 1.6 to 1.10.

4.8.7 Septic tanks or chemical toilets should be used as far as practicable. Grease traps for wastewater generated from the canteen, should also be provided. Any such treatment facilities should be frequently maintained to ensure proper function. Production water should be re-cycled to minimise the wastewater discharge, where possible.

4.8.8 Surface runoff from uncovered reclaimed area is controlled under the WPCO and should be properly managed. The good practices outlined in ProPECC PN 1/94 "Construction Site Drainage" should be followed as far as practicable in order to minimise surface runoff and the chance of erosion, and also to retain and reduce any suspended solids prior to discharge. These practices include, *inter alia*, the following items:

- Provision of perimeter channels to intercept storm-runoff from outside the site. These should be constructed in advance of site formation works and earthworks;

- Sand/silt removal facilities such as sand traps, silt traps and sediment basins should be provided to remove the sand/silt particles from run-off. These facilities should be properly and regularly maintained;

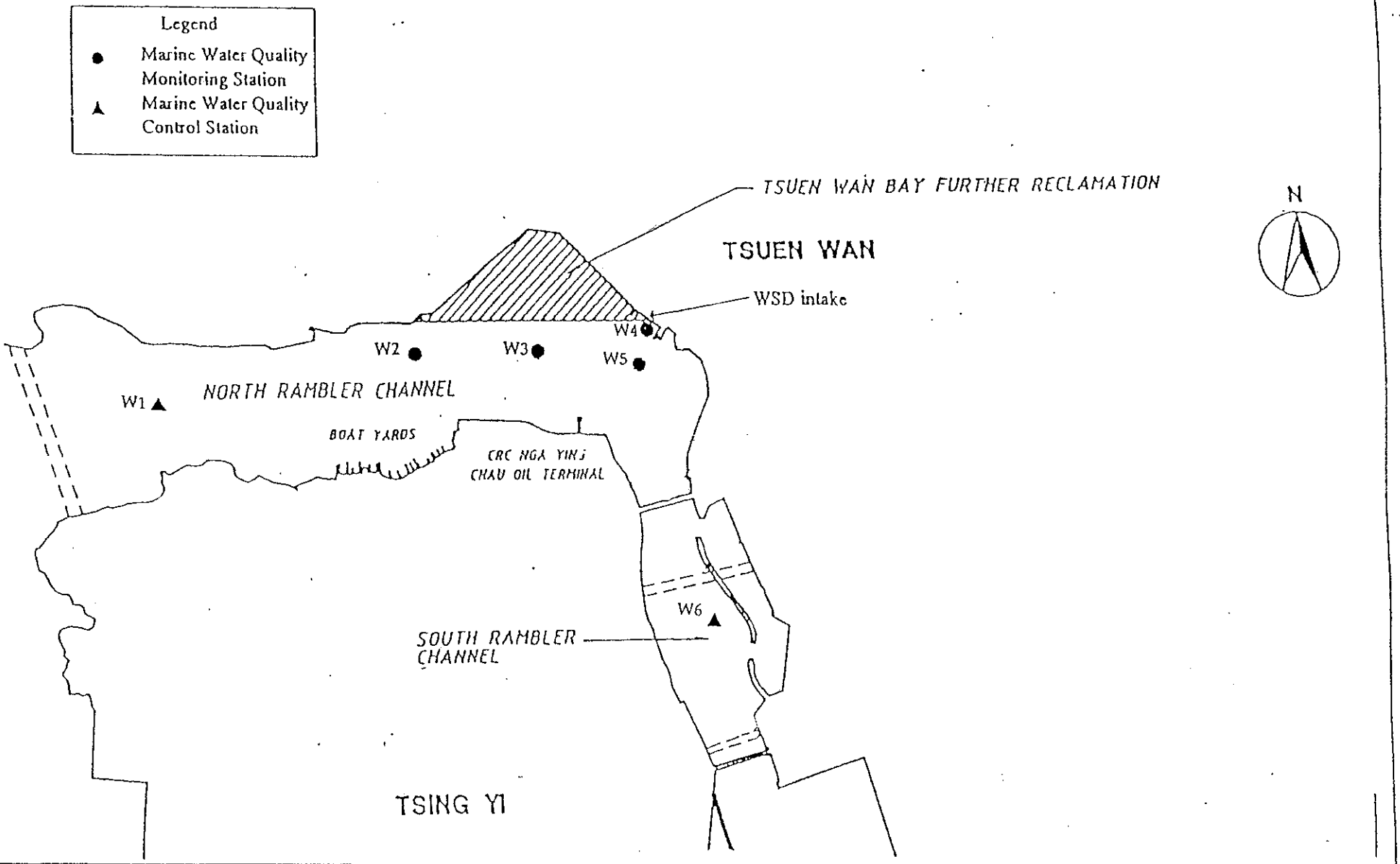
- Careful programming of the works to minimise soil excavation works during rainy seasons;

- Exposed soil surface should be protected by shotcrete or hydroseeding as soon as possible to reduce the potential of soil erosion;

- Temporary access roads should be protected by crushed gravel and exposed slope surfaces should be protected when rainstorms are likely;

- Trench excavation should be avoided in the wet season, and if necessary, these should be excavated and backfilled in short sections; and

- Open stockpiles of construction materials on site should be covered with tarpaulin or similar fabric during rainstorms.



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

MARINE WATER QUALITY MONITORING LOCATIONS

FIGURE 4.1

SCALE NOT TO SCALE

5 WASTE MANAGEMENT

5.0.1 The Contractor is responsible for waste control within the construction site, removal of the waste material produced from the site and to implement any mitigation measures to minimise waste or redress problems arising from the waste from the site. The waste material may include any sewage, waste water or effluent containing sand, cement, silt or any other suspended or dissolved material to flow from the site onto any adjoining land, storm sewer, sanitary sewer, or any waste matter or refuse to be deposited anywhere within the site or onto any adjoining land.

5.0.2 When handling the waste material, the following Good Site Practice (GSP) shall be adopted:

- Nomination of a site manager to be responsible for good site practice, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the terminal;
- Training of site personnel in proper waste management and chemical handling procedures;
- Construction wastes should be sorted on site into non-inert (C&D waste) and inert (public fill) fraction for reuse and recycling as far as practical. Non-inert fraction containing no more than 20% by volume of inert content can be disposed of at landfills, whilst the inert fraction (such as soil, rock, asphalt, concrete, brick building debris, etc.) should be delivered to public fills or other reclamation sites;
- The reuse and recycling of materials wherever possible;
- Provision of sufficient waste disposal points and regular collection for disposal;
- Provision of an enclosed transfer facility for storage and containment;
- Separation of chemical wastes for special handling and appropriate treatment at the chemical waste treatment facility;
- Refuse containers such as open skips should be provided at every work site for use by the workforce;
- Human waste should be discharged into septic tanks provided by the Contractors and be removed regularly by a hygiene services company;
- Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors; and
- Preparation for accidental spill and emergency action plans, including details for communications and alarm systems, evacuation procedures, fire control equipment, water supply and containment procedures and materials.

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

5.0.4 During the site inspections and the document review procedures as mentioned in Sections 6.1 and 6.2 of this manual, the ET Leader shall pay special attention to the issues relating to waste management, and check whether the Contractor has followed the relevant contract specifications and the procedures specified under the laws (see 5.4 above) of Hong Kong.

6 SITE ENVIRONMENTAL AUDIT

6.1 Site Inspections

6.1.1 Site Inspections provide a direct means to initiate and enforce specified environmental protection and pollution control measures. These shall be undertaken routinely to inspect construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. The site inspection is one of the most effective tools to enforce the environmental protection requirements on the construction site.

6.1.2 The ET Leader shall be responsible for formulating the environmental site inspection, the deficiency and action reporting system, and for carrying out site inspection works. Within 21 days of the construction contract commencement he shall submit a proposal for site inspection, and deficiency and action reporting procedures to the Contractor for agreement and to the ER for approval. The ET's proposal for rectification would be made known to the IC(E).

6.1.3 Regular site inspections shall be carried out at least once per week. The inspection shall not be limited to the environmental situation, pollution control and mitigation measures within the site and should also include the environmental situation outside the site area which is likely to be affected, directly or indirectly, by site activities. The ET Leader shall make reference to the following information in conducting inspections:

(I) EIA recommendations on environmental protection and pollution control mitigation measures;

(ii) works progress and programme;

(iii) individual works methodology proposals (which shall include proposal on associated pollution control measures);

(iv) contract specifications on environmental protection;

(v) relevant environmental protection and pollution control laws; and

(vi) previous site inspection results.

6.1.4 The Contractor shall keep the ET Leader updated with all relevant information on the construction contract necessary for him to carry out site inspections. Inspection results and associated recommendations for improvements to the environmental protection and pollution control works shall be submitted to the IC(E) and the Contractor within 24 hours. The Contractor shall follow the procedures and time-frame as stipulated in the environmental site inspection, and the deficiency and action reporting system formulated by the ET Leader, to report on any remedial measures subsequent to the site inspections.

6.1.5 Ad hoc site inspections shall also be carried out if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental

complaint, or as part of the investigation work, as specified in the Action Plan for environmental monitoring and audit.

6.2 Compliance with Legal and Contractual Requirements.

6.2.1 There are contractual environmental protection and pollution control requirements as well as environmental protection and pollution control laws in Hong Kong with which construction activities must comply.

6.2.2 In order that the works comply with contractual requirements, all works method statements submitted by the Contractor to the ER for approval shall be sent to the ET Leader for vetting to see whether sufficient environmental protection and pollution control measures have been included. The implementation schedule fo mitigation measures is summarised in **Appendix D**.

6.2.3 The ET Leader shall also review the progress and programme of the works to check that relevant environmental laws have not been violated, and that any foreseeable potential for violating laws can be prevented.

6.2.4 The Contractor shall regularly copy relevant documents to the ET Leader so that work checking can be carried out. The document shall at least include the updated Work Progress Reports, updated Works Programme, any application letters for different licence/permits under the environmental protection laws, and copies or all valid licences/permits. The site diary shall also be available for the ET Leader's inspection upon his request.

6.2.5 After reviewing the document, the ET Leader shall advise the ER and Contractor of any non-compliance with contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. If the ET Leader's review concludes that the current status on licence/permit application and any environmental protection and pollution control preparation works may result in potential violation of environmental protection and pollution control requirements, he shall also advise the Contractor and the ER accordingly.

6.2.6 Upon receipt of the advice, the Contractor shall undertake immediate action to correct the situation. The ER shall follow up to ensure that appropriate action has been taken in order to satisfy contractual and legal requirements.

6.3 Environmental Complaints

6.3.1 Complaints shall be referred to the ET Leader for action. The ET Leader shall undertake the following procedures upon receipt of any complaint:

(I) log complaint and date of receipt onto the complaint database and inform the IC(E) immediately;

(ii) investigate the complaint to determine its validity, and assess whether the source of the problem is due to works activities;

(iii) identify mitigation measures in consultation with the IC(E) if a complaint is valid and due to works;

(iv) advise the Contractor if mitigation measures are required;

(v) review the Contractor's response to identified mitigation measures, and the updated situation;

(vi) if the complaint is transferred from EPD, submit interim report to EPD on status of the complaint investigation and follow-up action within the time frame assigned by EPD;

(vii) undertake additional monitoring and audit to verify the situation if necessary, and review that circumstances leading to the complaint do not recur;

(vii) report investigation results and subsequent actions to complainant (if the source of complaint is EPD, the results should be reported within the time frame assigned by EPD); and

(viii) record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.

6.3.2 During any complaint investigation work, the Contractor and ER shall cooperate with the ET Leader in providing all necessary information and assistance for completion of the investigation. If mitigation measures are identified in the investigation, the Contractor shall promptly carry out the mitigation. The ER shall ensure that all necessary measures have been carried out by the Contractor.

7 REPORTING

7.1 General

7.1.1 Reports can be provided in an electronic medium upon agreeing the format with the ER and EPD. This would enable a transition from a paper/historic and reactive approach to an electronic/real time proactive approach. All the monitoring data (baseline and impact) shall also be submitted in diskettes format. The format for water quality monitoring data to be submitted in diskette is shown in **Attachment C**.

7.1.2 Types of reports that the ET Leader shall prepare and submit include baseline monitoring report, monthly EM&A report, quarterly EM&A summary report and annual/final EM&A review report. It should be noted that the water quality monitoring work will be carried out according to the work programme of seawall construction and would be suspended upon completion of the seawall. The quarterly EM&A summary reports are therefore not required for water quality in case the monitoring period is less than three months.

7.2 Baseline Monitoring Report

7.2.1 The ET Leader shall prepare and submit a Baseline Environmental Monitoring Report within 10 working days of completion of the baseline monitoring. Copies of the Baseline Environmental Monitoring Report shall be submitted to the Contractor, the IC(E), the ER and EPD. The ET Leader shall liaise with the relevant parties on the exact number of copies they require. The report format and baseline monitoring data format shall be agreed with EPD prior to submission.

7.2.2 The baseline monitoring report shall include at least the following:

(I) up to half a page executive summary;
(ii) brief project background information;
(iii) drawings showing locations of the baseline monitoring stations;
(iv) monitoring results (in both hard and diskette copies) together with the following information:
- monitoring methodology;
- name of laboratory and types of equipment used and calibration details;
- parameters monitored;
- monitoring locations (and depth where applicable);
- monitoring date, time, frequency and duration; and
- QA/QC results and detection limits.

(v) details of influencing factors, including:
- major activities, if any, being carried out on the site during the period;
- weather conditions during the period; and
- other factors which might affect results;

(vi) determination of the Action and Limit Levels for each monitoring parameter and statistical analysis of the baseline data, the analysis shall conclude if there is any significant difference between control and impact stations for the parameters monitored;
(vii) revisions for inclusion in the EM&A Manual; and

(viii) comments and conclusions.

7.3 Monthly EM&A Reports

7.3.1 The results and findings of all EM&A work required in the Manual shall be recorded in the monthly EM&A reports prepared by the ET Leader. The EM&A report shall be prepared and submitted within 10 working days of the end of each reporting month, with the first report due the month after construction commences. Each monthly EM&A report shall be submitted to four parties: the Contractor, the IC(E), the ER and the EPD. Before submission of the first EM&A report, the ET Leader shall liaise with the parties on the required number of copies and format of the monthly reports in both hard copy and electronic medium.

7.3.2 The ET leader shall review the number and location of monitoring stations and parameters every six months or on as needed basis in order to cater for any changes in the surrounding environment and the nature of works in progress.

First Monthly EM&A Report

7.3.3 The first monthly EM&A report shall include at least the following :

(I) a 1-2 page executive summary:
- Breaches of Action and Limit levels;
- Complaint Log;
- Notifications of any summons and successful prosecutions;
- Reporting Changes; and
- Future key issues.

(ii) basic project information:
- project organisation including key personnel contact names and telephone numbers;
- programme;
- management structure, and
- work undertaken during the month;

(iii) environmental status:
- works undertaken during the month with illustrations (such as location of works, daily dredging/filling rates, percentage fines in the fill material used); and
- drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.

(iv) a brief summary of EM&A requirements including:
- all monitoring parameters;
- environmental quality performance limits (Action and Limit levels);
- Event-Action Plans;
- environmental mitigation measures, as recommended in the project EIA study final report; and
- environmental requirements in contract documents;

(v) implementation status:
- advice on the implementation status of environmental protection and

pollution control/mitigation measures, as recommended in the project EIA study;

(vi) monitoring results (in both hard and diskette copies) together with the following information;
- monitoring methodology;
- name of laboratory and types of equipment used and calibration details;
- parameters monitored;
- monitoring locations (and depth);
- monitoring date, time, frequency, and duration;
- weather conditions during the period;
- any other factors which might affect the monitoring results; and
- QA/QC results and detection limits.

(vii) report on non-compliance, complaints, notifications of summons and successful prosecutions:
- record of all noncompliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
- record of all notification of summons and successful prosecutions for breaches of current environmental protection/pollution control legislations, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
- review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
- description of the actions taken in the event of noncompliance and deficiency reporting and any follow-up procedures related to earlier noncompliance.

(viii) Others
- an account of the future key issues as reviewed from the works programme and work method statements; and
- advice on the solid and liquid waste management status.

Subsequent EM&A Reports

7.3.4 Subsequent monthly EM&A reports shall include the following :

(I) executive summary (1-2 pages):
- breaches of Action and Limit levels;
- complaints log;
- notifications of any summons and successful prosecutions;
- reporting changes; and
- future key issues.

(ii) basic project information:
- project organisation including key personnel contact names and telephone numbers;

- programme;
- management structure, and
- work undertaken during the month;

(iii) environmental status:

- works undertaken during the month with illustrations (such as location of works, daily dredging/filling rates, percentage fines in the fill material used); and
- drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.

(iii) implementation status:

- advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project EIA study;

(iv) monitoring results (in both hard and diskette copies) together with the following information;

- monitoring methodology;
- name of laboratory and types of equipment used and calibration details;
- parameters monitored;
- monitoring locations (and depth);
- monitoring date, time, frequency, and duration;
- weather conditions during the period;
- any other factors which might affect the monitoring results; and
- QA/QC results and detection limits.

(v) report on non-compliance, complaints, notifications of summons and successful prosecutions:

- record of all noncompliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
- record of all notification of summons and successful prosecutions for breaches of current environmental protection/pollution control legislations, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
- review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
- description of the actions taken in the event of noncompliance and deficiency reporting and any follow-up procedures related to earlier noncompliance.

(vi) others

- an account of the future key issues as reviewed from the works programme and work method statements; and
- advice on the solid and liquid waste management status.

(vii) appendix

- Action and Limit levels;
- graphical plots of trends of monitored parameters at key stations over the

past four reporting periods for representative monitoring stations annotated against the followings:

a) major activities being carried out on site during the period;
b) weather conditions during the period; and
c) any other factors which might affect the monitoring results.

- monitoring schedule for the present and next reporting period;
- cumulative statistics on complaints, notifications of summons and successful prosecutions; and
- outstanding issues and deficiencies.

7.4 Quarterly EM&A Summary Reports

7.4.1 A quarterly EM&A summary report of around 5 pages shall be produced and shall contain at least the following information:

(i) up to half a page executive summary;
(ii) basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of work undertaken during the quarter;
(iii) a brief summary of EM&A requirements including:
- monitoring parameters;
- environmental quality performance limits (Action and Limit levels); and
- environmental mitigation measures, as recommended in the project EIA study final report;

(iv) advice on the implementation status of environmental protection and pollution control/ mitigation measures, as recommended in the project EIA study report, summarised in the updated implementation schedule;
(v) drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
(vi) graphical plots of any trends in monitored parameters over the past 4 months (the last month of the previous quarter and the present quarter) for representative monitoring stations annotated against;
- the major activities being carried out on site during the period;
- weather conditions during the period; and
- any other factors which might affect the monitoring results;

(vii) advice on the solid and liquid waste management status;
(viii) a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
(ix) a brief review of the reasons for and the implications of any non-compliances, including a review of pollution sources and working procedures;
(x) a summary description of actions taken in the event of non-compliance and any follow-up procedures related to any earlier non-compliances;
(xi) a summarized record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
(xii) comments (e.g. effectiveness and efficiency of the mitigation measures), recommendations (e.g. any improvement in the EM&A programme) and conclusions for the quarter; and
(xiii) proponents' contacts and any hotline telephone number for the public to make

enquiries.

7.5 Annual/Final EM&A Review Reports

7.5.1 The annual/final EM&A report should contain at least the following information:

(I) executive summary (1-2 pages);

(ii) drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;

(iii) basic project information including a synopsis of the project organization, contacts of key management, and a synopsis of work undertaken during the course of the project or past twelve months;

(iv) a brief summary of EM&A requirements including:

a) environmental mitigation measures, as recommended in the project EIA study final report;

b) environmental impact hypotheses tested;

c) environmental quality performance limits (Action and Limit levels);

d) all monitoring parameters;

e) Event-Action Plans.

(v) a summary of the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project EIA study report, summarised in the updated implementation schedule;

(vi) graphical plots and the statistical analysis of the trends of monitored parameters over the course of the project, including the post-project monitoring (or the past twelve months for annual reports) for all monitoring stations annotated against;

- the major activities being carried out on site during the period;
- weather conditions during the period; and
- any other factors which might affect the monitoring results;

(vii) a summary of noncompliance (exceedances) of the environmental quality performance limits (Action and Limit levels);

(viii) a review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate;

(ix) a description of the actions taken in the event of non-compliance;

(x) a summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;

(xi) a summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, locations and nature of the breaches, investigation follow-up actions taken and results;

(xii) a review of the validity of EIA predictions and identification of shortcomings in EIA recommendations; and

(xiii) a review of the effectiveness and efficiency of the mitigation measures;

(xiv) a review of success of the EM&A programme to cost effectively identify deterioration and to initiate prompt effective mitigatory action when necessary.

7.6 Data Keeping

7.6.1 No site based documents (such as monitoring field records, laboratory analysis records, site inspection forms, etc.) are required to be included in the monthly EM&A reports.

However, any such document shall be well kept by the ET Leader and be ready for inspection upon request. All relevant information shall be clearly and systematically recorded in the document. Monitoring data shall also be recorded in magnetic media form, and the software copy must be available upon request. Data format shall be agreed with EPD. All documents and data shall be kept for at least one year following completion of the construction contract.

7.7 Interim Notifications of Environmental Quality Limit Exceedances

7.7.1 With reference to Event/Action Plans in **Tables 2.2, 3.2 and 4.2**, when the environmental quality limits are exceeded, the ET Leader shall immediately notify the IC(E) and EPD, as appropriate. The notification shall be followed up with advice to IC(E) and EPD on the results of the investigation, proposed action and success of the action taken, with any necessary follow-up proposals. A sample template for the interim notifications is presented in **Attachment B**.

ATTACHMENT A

SAMPLES OF DATA RECORDING SHEETS FOR DUST, NOISE AND WATER QUALITY MONITORING

The following three attachments are attached to this Attachment A:

Table A-1 TSP Monitoring Field Record Sheet

Monitoring Location		
Details of Location		
Sampler Identification		
Date & Time of Sampling		
Elapsed-time Meter Reading	Start (min.)	
	Stop (min.)	
Total Sampling Time (min.)		
Weather Conditions (indicate wind speed & direction)		
Site Conditions		
Initial Flow Rate, Qsi	Pi (mmHg)	
	Ti (°C)	
	Hi (in.)	
	Qsi (Std. m^3)	
Final Flow Rate, Qsf	Pf (mmHg)	
	Tf (°C)	
	Hf (in.)	
	Qsf (Std. m^3)	
Average Flow Rate (Std. m^3)		
Total Volume (Std. m^3)		
Filter Identification No.		
Initial Wt. of Filter (g)		
Final Wt. of Filter (g)		
Measured TSP Level ($\mu g/m^3$)		

	Name & Designation	Signature	Date
Field Operator :			
Laboratory Staff :			
Checked by :			

Table A-2 Noise Monitoring Field Record Sheet

Monitoring Location		
Description of Location		
Date of Monitoring		
Measurement Start Time (hh:mm)		
Measurement Duration (min.)		
Noise Meter Model/Identification		
Calibrator Model/Identification		
Measurement Results	L_{90} (dB(A))	
	L_{10} (dB(A))	
	L_{eq} (dB(A))	
Major Construction Noise Source(s) During Monitoring		
Other Noise Source(s) During Monitoring		
Remarks		

	Name & Designation	Signature	Date
Recorded By :	_____	_____	_____
Checked By :	_____	_____	_____

Table A-3 Water Quality Monitoring Data Record Sheet

Location							
Date							
Start Time (hh:mm)							
Weather							
Sea Conditions							
Tidal Mode							
Water Depth (m)							
Monitoring Depth		Surface		Middle		Bottom	
Salinity (ppt)							
Temperature (°C)							
DO Saturation (%)							
DO (mg/l)							
Turbidity (NTU)							
SS Sample Identification							
SS (mg/l)							
Observed Construction Activities	< 100 m from locatioin						
	> 100 m from location						
Other Observations							

	Name & Designation	Signature	Date
Recorded By:	_____	_____	_____
Checked By:	_____	_____	_____

Note: The SS results are to be filled up once they are available from the laboratory.

ATTACHMENT B

SAMPLE TEMPLATE FOR INTERIM NOTIFICATIONS OF ENVIRONMENTAL QUALITY LIMITS EXCEEDANCES

Sample Template for Interim Notifications of Environmental Quality Limits Exceedances

Incident Report on Action Level or Limit Level Non-compliance

Project	
Date	
Time	
Monitoring Location	
Parameter	
Action & Limit Levels	
Measured Level	
Possible reason for Action or Limit Level Non-compliance	
Actions taken / to be taken	
Remarks	

Location Plan

Prepared by : _____

Designation : _____

Signature : _____

Date : _____

ATTACHMENT C

SAMPLE DATA FORMAT FOR WATER QUALITY MONITORING

Data Format for Water Quality Monitoring

A. The following is the data base structure for water quality monitoring:

	Field Name	Type	Width	Dec	Remark
1	Cont id	C	3	1	Given by EPD
2	Wa id	C	2		Given by EPD
3	Stn	C	3		e.g. M1, M2, C1, C2
4	Weather	C	10		Sunny, Rain, Cloudy
5	Tidestat	C	10		Mid ebb, Mid flood
6	Amb Temp	N	4	1	Ambient temp
7	Sdate	D	8		Sampling date
8	Time	C	5		Sampling time e.g. 0935
9	Wdept	N	4	1	Height of water column
10	Sno	C	1		2=duplicated sample
11	Sdept	C			S=surface, M=middle, B=Bottom
12	Temp	N	4	1	Water temperature
13	Sal	N	6	2	Salinity
14	DO	N	6	2	Dissolved oxygen
15	DOS	N	6	2	Sat dissolved oxygen
16	Tub	N	6	2	Turbidity
17	SS	N	6	2	Suspended Solid

(Remark: Enter 99.99 to any numeric field that have no reading. 'Zero' is also a valid data. All data must be read on PC platform.)

B: Apart from the above, the following information should also be provided:

1. Project name, contract number, consultant name and telephone, contractor name, contact person and telephone number, site staff and telephone;

2. Project work nature e.g. dumping or reclamation, project commencement date and proposed completion date, frequency of sampling i.e. twice per week or something else;

3. Nature of stations i.e. monitoring or control stations, position of stations i.e. easting, northing and latitude, longitude; and

4. List of site instrument of water quality monitoring.

ATTACHMENT D

IMPLEMENTATION SCHEDULE OF MITIGATION MEASURES

Table D.1 Implementation Schedule of Mitigation Measures

Item No.	EIA Ref.	Activity	Environmental Protection Measurement	Timing	Responsibilities for Implementation	Audit Method
1		Environmental monitoring	• To monitor the nearby air quality, water quality and noise level to identify any need for additional mitigation measures or modifying methods of work if non-compliance arise. • Samples to be analysed using testing procedures as specified in the EM&A manual.	During the construction period (2002 - 2006)	Contractor to employ an ET responsible for EM&A. ER to employ an IC(E) to undertake work Contractor/ER to ensure samples are tested in accordance to the EM&A manual.	ET leader to ensure EM&A procedures are correctly implemented. IC(E) to audit records and procedures used by ET. IC(E) to check monitoring results and laboratory testing.
Air Quality						
2	EIA Sec 6.3.1 EM&A Sec 2.8.1 to 2.8.2	Land Construction activities in general	• Use of regular watering to reduce dust emissions from exposed site surfaces and unpaved roads, at least twice daily with complete coverage, particularly during dry weather; • Use of frequent watering for particularly dusty static construction areas and areas close to air quality sensitive receivers; • Side enclosure and covering of any aggregate or dusty material storage piles to reduce emissions. Where this is not practicable owing to frequent usage, watering should be employed to aggregate fines; • Open stockpiles should be avoided or covered. Where possible, prevent placing dusty material storage piles near air quality sensitive receivers; • Provision of barriers, which may be the temporary noise barrier, between the site and nearby air quality sensitive receivers to act as dust barriers; • Tarpaulin covering of all dusty vehicle loads transported to, from and between site locations; • Establishment and use of vehicle wheel and body washing facilities at the exit points of the site, combined with cleaning of public roads where necessary; and • Provision of wind shield and dust extractor at the loading points and use of water sprinklers at the loading area; • Imposition of speed controls for vehicles on unpaved site roads. Eight kilometres per hour is the recommended limit by EPD; • Where feasible, routing of vehicles and positioning of construction plant should be at the maximum possible distance from air quality sensitive receivers.	During the construction period (2002 - 2006)	The Contractor to adopt good operational practices for dust minimisation to reduce dust nuisance to a minimum; Contractor to submit all work methods to ER for approval. ER to check with ET and IC(E) to ensure all control and mitigation measures are adopted wherever practicable.	ET to formulate the environmental site inspection, the deficiency and action reporting system, and to carry out site inspection works. IC(E) to audit site inspection records and procedures used by ET.
3	EIA Sec 6.3.4 EM&A Sec 2.8.4	Grab dredging	• Open stockpiles of the excavated material should be avoided or covered. Where possible, prevent odorous stockpiles near air quality sensitive receivers. • Whenever the construction or maintenance program allows, dredging activities (normal dredging or suction dredging) should be undertaken during the cold season, when bioactivity and thus odorous gas production is low. Odour impacts to nearby sensitive receivers will thus be reduced.	During the construction period (2002 - 2006)	Contractor responsible for implementation. Contractor to provide work programme of dredging to ET and ER for approval	ET to carry out site inspection during dredging activities and to report any deficiency and action required. IC(E) to check the site inspection results. IC(E) to check the work programme with the Contractor, ET and ER to ensure minimal odour impact to the nearby SRs.

Item No.	EIA Ref.	Activity	Environmental Protection Measurement	Timing	Responsibilities for Implementation	Audit Method
4	EIA Sec 6.3.5 EM&A Sec 2.8.5	Suction dredging	• Dredged material should be pumped through a closed pipeline from the dredging point towards its destination. This will minimise odorous emissions due to resuspension and exposure of dredged material to the air. • By injecting a solution of iron salts (or any other product able to eliminate production of hydrogen sulphide) into the closed pipeline, emission of hydrogen sulphide from the outlet of the pipeline will be reduced.	During the construction period (2002 - 2006)	Contractor responsible for implementation	ET to audit the suction dredging (if any). Inspect the dredging activities and interview staff to ensure that this occurs as standard practice.
5.	EIA Sec 6.2 Figures 6.3, 6.7	Operational air impact	• The height of future developments (i.e. the open space Area 102B) located within the height restriction zone should be below 90m; • The location of the proposed ventilation shaft should be at a distance of 100m or more from any ASRs to minimise the air quality impact.	Before occupation of Site 102. Before operation of the tunnel	TDD responsible for implementation	
Noise						
6	EIA Sec 5.1.12 to 5.1.14 EM&A Sec 3.6.1 to 3.6.2	All construction activities in general	• Number and sound power levels (SWL) of powered mechanical equipment should not exceed the values recommended below: **PME Item** / **No. of Item** / **Recommended SWL per Item, dB(A)** PHASE#1 RECLAMATION WORKS *TUG BOAT* (for placement of sandfill in Area 35) — 3 — 110 *DREDGER* (grab, for seawall dredging) — 2 — 112 *DERRICK BARGE* (for seawall construction) — 1 — 104 *TUG BOAT* (for seawall construction) — 2 — 110 *TUG BOAT* (for placement of further sandfill in Area 35) — 2 — 110 PHASE#2 VERTICAL BAND DRAIN INSTALLATION: AREA A *INSTALLATION RIG* (for installation of vertical band drains) — 2 — 112 PHASE#3 RECLAMATION WORKS *DERRICK BARGE* (for placement of public dump and seawall buildup in Area A) — 2 — 104 *DUMP TRUCK* (for placement of public dump and seawall buildup in Area A) — 2 — 110 *INSTALLATION RIG* (for installation of vertical band drains in Area C) — 2 — 112	During the construction period (2002 - 2006)	The Contractor responsible for implementation. Contractor to discuss the work methods with the ET and IC(E) and the proposed work methods should be agree with ER	ET to formulate the environmental site inspection, the deficiency and action reporting system, and to carry out site inspection works. IC(E) to audit site inspection records and procedures used by ET

Item No.	EIA Ref.	Activity	Environmental Protection Measurement			Timing	Responsibilities for Implementation	Audit Method
6 cont'd		All construction activities in general (cont'd)	PHASE#4 RECLAMATION WORKS					
			DUMP TRUCK (for placement of surcharge in Area A)	2	110			
			DUMP TRUCK (for surcharge maintenance period in Area A)	5	110			
			DERRICK BARGE (for placement of public dump in Area C)	1	104			
			DUMP TRUCK (for placement of public dump in Area C)	1	117			
			DERRICK BARGE (for sandfill placement in Area D)	1	104			
			TUG BOAT (for sandfill placement in Area D)	2	110			
			DUMP TRUCK (for placement of sandfill in Area D)	5	110			
			PHASE#5 RECLAMATION WORKS					
			DUMP TRUCK (for removal of surcharge in Area A)	5	110			
			DUMP TRUCK (for placement of surcharge in Area C)	1	110			
			INSTALLATION RIG (for installation of vertical drains in Area D)	1	112			
			DUMP TRUCK (for placement of public dump and surcharge fill in Area D)	5	110			
			INSTALLATION RIG (for installation of vertical drains in Area E)	2	112			
			PHASE#6 RECLAMATION WORKS					
			DUMP TRUCK (for surcharge maintenance period in Area C)	1	110			
			DUMP TRUCK (for surcharge removal in Area C)	1	110			
			DUMP TRUCK (for surcharge maintenance in Area D)	5	110			
			DUMP TRUCK (for surcharge removal in Area D)	5	110			
			DERRICK BARGE (for placement of public dump and surcharge fill in Area E)	1	104			
			DUMP TRUCK (for placement of public dump and surcharge fill in Area E)	5	110			
7	EIA Sec 5.2	Operational noise	Window should be oriented at locations shown below (by adjustment of the openable window to reduce the angle of exposure to traffic).			During detailed design stage	Housing Department responsible for implementation	
			Location	**EIA Reference**				
			Facade A1-21, Block F, Site 101	Sec 5.2.8, Figure 5.2				
			Facade A1-9, Block A, Site 101	Sec 5.2.10, Figure 5.2				
			Facade A2-25, Block A, Site 102	Sec 5.2.12, Figure 5.3				
			Facade A2-13, Block C, Site 102	Sec 5.2.13, Figure 5.3				
			Facade A2-15, Block C, Site 102	Sec 5.2.13, Figure 5.3				
			Facade A2-16, Block C, Site 102	Sec 5.2.13, Figure 5.3				
			Facade A2-48, Block E, Site 102	Sec 5.2.14, Figure 5.3				

Item No.	EIA Ref.	Activity	Environmental Protection Measurement	Timing	Responsibilities for Implementation	Audit Method
7 cont'd		Operational noise (cont'd)	Set backs from the carriageways should be incorporated into the planning layout of land uses in the area as follows: **Block** **Major Traffic Noise Contributor** **Minimum Setback Distance from the carriageways (m)** Area 101 (PSPS) 2400 Flats A Hoi On Road 46 A Road D1 16 B-E Hoi On Road 85 B-E Road L1 46 F Road L1 12 Area 102 (PSPS) 200 Flats A Hoi On Road 44 A Road D1 15 B,C Hoi On Road 93 B,C Tsuen Wan Road 216 D-F Hoi Hing Road 18 D-F Tsuen Wan Road 76 D-F Road D2 15 D-F Road D3 23 Area 103 (R1) 3000 Flats All Road L1 18 All Road L2 10 All Road D3 15 Area 104 (RS) 3600 Flats A Hoi Hing Road 8 A Tsuen Wan Road 72 A Road D2 22 B Road D2 22 B Road D3 50 B Road L2 6 B Roundabout 10 C-E Tsuen Wan Road 134 C-E Road L2 8	Before occupation of Sites 101, 102, 103 and 104	Site 103 Private developer responsible for implementation subject to lease conditions imposed by DLO. Sites 101, 102, 104 Housing Department Responsibl e implementation	

Item No.	EIA Ref.	Activity	Environmental Protection Measurement	Timing	Responsibilities for Implementation	Audit Method
7 cont'd		Operational noise (cont'd)	Podium extension (h=15m) at locations shown below: **Location:** NE boundary of the podium, Blocks A and B, Site 101 **Distance from the extended podium to the kerb side of Road D1:** 3 m **EIA Reference:** Sec 5.2.9, Figure 5.2 **Location:** NE, NW & SW boundaries of the podium, Block A, Site 102 **Distance from the extended podium to the kerb side of Road D1:** 5 m **Length of the extended podium along Road D1:** 67 m (chainage: 140 to 207 m) **Width of the extended podium from edge facing Road D1:** 62 m **EIA Reference:** Sec 5.2.12, Figure 5.3	Before occupation of Sites 101 and 102	**Site 101,102** Housing Department responsible for implementation	
			Provision of appropriate acoustic insulation (ref: Table 2, Annex 5 of the TM) and air conditioning system to alleviate residual traffic noise impacts at Sites 102 and 104	Before occupation of Sites 102 and 104	Housing Department responsible for implementation.	
			Provision of concrete boundary wall (h=5m) at the following locations: **Location** — **Total Length** — **EIA Reference** NW & NE site boundary, Block A, Site 104 — 157 m — Sec 5.2.20, Figure 5.4	Before occupation of Site 104	Housing Department responsible for implementation	
			Provision of concrete boundary wall (h=3m) at the locations shown below: **Location** — **Total Length** — **EIA Reference** NW site boundary of Block B, Site 104 (on selected sections of Road D2 & L2) — 105 m — Sec 5.2.21, Figure 5.4 S & E site boundaries of Blocks D & E, Site 104 (on selected section of Road L2) — 134 m — Sec 5.2.22, Figure 5.4 SE site boundary of secondary school, Site 101 (on selected section of Road L1) — 75 m — Sec 5.2.27, Figure 5.2 NE site boundary of secondary school, Site 103 (on roundabout of Road D2, L2 & D3) — 75 m — Sec 5.2.27, Figure 5.4 E site boundary of secondary school, Site 103 (on selected section of Road L2) — 66 m — Sec 5.2.27, Figure 5.4 SW site boundary of primary school, Site 104 (on selected section of Road L2) — 80 m — Sec 5.2.27, Figure 5.4	Before occupation of Sites 101, 103 and 104	**Residential Blocks in Site 104 (PS)** Housing Department responsible for implementation **School Sites** ASD responsible for implementation	

Item No.	EIA Ref.	Activity	Environmental Protection Measurement	Timing	Responsibilities for Implementation	Audit Method
7 cont'd		Operational noise (cont'd)	Provision of canopy type barriers at the kerb side of selected sections of new roads as indicated below: **Location 1:** New roads in the southwest of the proposed tunnel Chainage: Northern lane: 5195m to 5244m and 5263m to 5411m Southern lane: 1195m to 1398m, Eastern ramp: 1453m to 1602 m Dimension: 5m tall + 2m overhang EIA Reference: Sec 5.2.31, Figures 5.5, 5.8a, 5.8b **Location 2:** New ramp connecting the proposed tunnel and Tsuen Wan Road Chainage: 6462m to 6832 m Dimension: 5m tall + 3m overhang EIA Reference: Sec 5.2.33, Figures 5.6, 5.8c	Before roads opening	TDD responsible for implementation	
Water Quality						
8	EIA Sec 7.1.12 and 7.4.2 to 7.4.5 EM&A Sec 4.8.1 to 4.8.4	Dredging and dumping	• Properly maintained closed mechanical grabs should be used to minimise spillage and should seal tightly while being lifted; • The decks of all vessels should be kept tidy and free of oil or other substances that might be accidentally or otherwise washed overboard; • Loading of barges and hoppers should be controlled to prevent splashing of dredged materials to the surrounding environment and barges and hoppers should under no circumstances be filled to a level which would cause overflowing of material or sediment laden waters during loading and transportation; • Silt screens should be provided and maintained at the following intakes: WSD Tsuen Wan Saltwater Intake, KCRC Temporal Intake, the Kwai Chung Incinerator Intake and Oil Depot Pump House North Intake during marine construction work; • Silt curtains should be in place during dredging and filling works to minimise the dispersion of sediment plume; and • If monitoring results indicated that the reclamation activities caused a significant impact to the sensitive receivers, in particular the WSD intake at TWB, construction programmes should be scheduled carefully to stagger construction activities such that dredging of seawall foundation and filling of sand blanket will not be carried out on the same day. If necessary, works should be slowed down or suspended until such impact is reduced to an acceptable level; • The maximum dredging rate of marine mud should not exceed 7,500 cu.m per day; • The maximum dumping rate of marine mud should not exceed 7,500 cu.m per day; • The maximum filling rate of the sand blanket on top of the existing seabed should not exceed 4,500 cu.m per day; • The maximum filling rate of the sand capping on top of the dredged mud placed in the site should not exceed 9,000 cu.m per day; • Isolate the dredged mud placed in the site from the environment by a sand capping layer of 2 m thick.	During the construction period (2002 - 2006)	TDD and Contractor responsible for implementation. Contractor to review and discuss the work methods with the ET and IC(E) and the work methods should be agreed with ER	ET to carry out site inspection during dredging activities and to report any deficiency and action required. IC(E) to check the site inspection results.

Item No.	EIA Ref.	Activity	Environmental Protection Measurement	Timing	Responsibilities for Implementation	Audit Method
9	EIA Sec 7.4.2 EM&A Sec 4.8.2	Seawall construction	• The critical activities during phase I, construction of the seawall foundation, should be scheduled to be carried out in the dry season when predicted impacts are less significant.	During the construction period (2002)	Contractor to provide work programme of dredging to ET and ER for approval	IC(E) to check the work programme with the Contractor, ET and ER to ensure minimal odour impact to the nearby SRs.
10	EIA Sec 7.1.35, 7.1.36, 7.4.1, 7.4.6 to 7.4.7 EM&A Sec 4.8.6 to 4.8.8	Land construction	• Divert storm drains at early stage following the sequence and timing indicated in Figures 1.6 to 1.10 of the EM&A Manual; • Septic tanks or chemical toilets should be used as far as practicable. Grease traps for wastewater generated from the canteen, should also be provided. Any such treatment facilities should be frequently maintained to ensure proper function. Production water should be re-cycled to minimise the wastewater discharge, where possible. • Provision of perimeter channels to intercept storm-runoff from outside the site. These should be constructed in advance of site formation works and earthworks; • Sand/silt removal facilities such as sand traps, silt traps and sediment basins should be provided to remove the sand/silt particles from run-off. These facilities should be properly and regularly maintained; • Careful programming of the works to minimise soil excavation works during rainy seasons; • Exposed soil surface should be protected by shotcrete or hydroseeding as soon as possible to reduce the potential of soil erosion; • Temporary access roads should be protected by crushed gravel and exposed slope surfaces should be protected when rainstorms are likely; • Trench excavation should be avoided in the wet season, and if necessary, these should be excavated and backfilled in short sections; • Open stockpiles of construction materials on site should be covered with tarpaulin or similar fabric during rainstorms; • Storage tanks and drums shall be stored in bunded area with 110% of the tank and drum capacity. All storage tanks shall be fitted with high level alarms and leak detector systems. Drainage from bunded area shall be directed by a sump to oil interceptors with sufficient capacity to retain major spill; and • Open refuelling area and parking area shall be on hard-standing area with perimeter channels directed to stormdrain via petrol interceptor.	During the construction period (2002 -2006)	The Contractor to adopt good operational practices to reduce water pollution to a minimum; Contractor to submit all work methods to ER for approval. ER to check with ET and IC(E) to ensure all control and mitigation measures are adopted wherever practicable.	ET to formulate the environmental site inspection, the deficiency and action reporting system, and to carry out site inspection works. IC(E) to audit site inspection records and procedures used by ET
11.	EIA Sec 7.4.5 EM&A Sec 4.8.5	Public dump and bulk filling	• Complete the Eastern seawall (about 500 m in length) to +4.5 m.P.D. prior to commencement of public dumping and bulk filling in Area A and B; • Complete the Western seawall (about 450 m in length) to +4.5 m.P.D. prior to commencement of public dumping and bulk filling in Area C; • Floating refuse collection programme to be set up to prevent floating refuse from leaving the site.	During the construction period (2002 -2006)	The contractor should be responsible for the implementation of these measures. Contractor to submit the floating refuse collection programme to ER for approval.	ET and IC(E) to check the actual programme of the work and to report any deficiency and action required.

Item No.	EIA Ref.	Activity	Environmental Protection Measurement	Timing	Responsibilities for Implementation	Audit Method
12	EIA Sec 10.3.19	Miscellaneous	• The pollution status of stormdrains, which discharge pollutants into the reclamation, should be reviewed during the detailed design stage by collecting samples. The results shall be submitted to EPD. If EPD consider the pollution in the stormdrains to be a concern, further consideration can be still given, well in advance of the reclamation, will be given to rectify the situation	During the detailed design stage	TDD shall be responsible for the implementation	
Waste Management						
13.	EIA Sec 8.1.10 EM&A Sec 5.0.2	All construction activities in general	• Nomination of a site manager to be responsible for good site practice, arrangements for collection and effective disposal to an appropriate facility, of all wastes generated at the terminal; • Training of site personnel in proper waste management and chemical handling procedures; • Construction wastes should be sorted on site into non-inert (C&D waste) and inert (public fill) fraction for reuse and recycling as far as practical. Non-inert fraction containing no more than 20% by volume of inert content can be disposed of at landfills, whilst the inert fraction (such as soil, rock, asphalt, concrete, brick building debris, etc.) should be delivered to public fills or other reclamation sites; • The reuse and recycling of materials wherever possible; • Provision of sufficient waste disposal points and regular collection for disposal; • Provision of an enclosed transfer facility for storage and containment; • Separation of chemical wastes for special handling and appropriate treatment at the chemical waste treatment facility; • Refuse containers such as open skips should be provided at every work site for use by the workforce; • Human waste should be discharged into septic tanks provided by the Contractors and be removed regularly by a hygiene services company; • Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors; • Preparation for accidental spill and emergency action plans, including details for communications and alarm systems, evacuation procedures, fire control equipment, water supply and containment procedures and materials; and • The volume of marine mud to be dredged from the seawall trench and disposed of within the reclamation is about 0.2 Mcu.m.	During the construction period (2002 -2006)	Contractor responsible for implementation	ET to conduct site inspections to check whether the Contractor has followed the relevant specifications and procedures. IC(E) to check the ET's audit procedures and results

ATTACHMENT E

COMMENTS AND RESPONSES

A summary of the comments and responses is presented in the following order:

1. Agriculture and Fisheries Department
2. Civil Engineering Department
3. Drainage Services Department
4. District Office (Tsuen Wan)
5. Environmental Protection Department
6. Fire Services Department
7. Highways Department
8. Highways Department
9. Highways Department
10. Hong Kong Housing Authority
11. Kowloon Canton Railway Corporation
12. Lands Department - District Lands Office, Tsuen Wan
13. Marine Department
14. Planning Department
15. Regional Services Department
16. Transport Department
17. Water Supplies Department

	Comments Received	Consultant's Responses
1	Agriculture & Fisheries Department Date: 8 December 1997 Ref: (20) in AF DVL 10/1 IV	
1.1	I have no comments on the above application.	Noted.
2	Civil Engineering Department Date: 5 January 1998 Ref: (17) in TS CG/CE26(94).0 Pt.6	
2.1	I refer to your above quoted letter and have no comments on the subject documents.	Noted.
3	Drainage Services Department Date : 8-12-97 Ref: (2) in MS 8/CE2694/0	
3.1	No comment.	Noted.
4	District Office (Tsuen Wan) Date: 7 January 1998 Ref: (32) in TWD/1/35 IX	
4.1	Thank you for letting us have sight of the reports on which we do not have any particular comment.	Noted.

	Comments Received	Consultant's Responses
5	Environmental Protection Department Date: 27 December 1997 Ref: ( ) in EP2/N2/32 (Pt.15)	
5.1	General Comments	
5.1a	It is stated in the EIA Final Assessment Report (Draft) that the worst scenario for dredging and filling activities involves the mobilization of 9000 m^3 (maximum) solids per day during Phase I of the reclamation work. This critical period for the formation of submerged sea wall will last only for a maximum of three months. Provided that appropriate mitigation measures are deployed and used during this period of time, the expected impact on nearby sensitive receivers (especially Tsuen Wan WSD intake) will be minimum. As a consequence, the proposed intensive monitoring works do not match with the reclamation programme. The monitoring work can be suspended once the sea wall is built above the sea level and if the monitoring work reveals that there is no adverse impact arise from the public dumping activities (shortly after the completion of sea wall).	Noted and agreed. We have incorporated this comment into Section 4.6.3 of the final report
5.1b	The contents and format of the draft EM&A manual is basically followed the first version of the Generic EM&A Manual, which is now quite outdated. An Independent Checker (Environment) (IC(E)) is advised to be added within the project organisation structure (*c.f.* Figure 1.4 of the draft EM&A Manual) and the whole EM&A manual. We have attached a draft revised version for your reference/information. Please note that this revised version is in a drafting stage.	The text and Figure 1.4 will be revised.
5.1c	The EM&A manual should also provide the rationales for the proposed water quality monitoring parameters. For this project, a focused EM&A programme should have been designed to monitor and audit whether there is any unacceptable increase in suspended solids/turbidity and decrease in dissolved oxygen during the formation of the seawall. If the monitoring results indicate that there are impacts, what will be the action and mitigation measures to be taken. Although there are some technical shortcomings, the framework of the submitted draft EM&A manual can still be used to fulfil these requirements.	Noted and agreed. The text in Section 4.1 will be revised to fulfil these requirements.
5.2	Specific Comments	
5.2a	Introduction (Section 1)	
	Information on contact personnel of all involved parties should be given, preferably, in text and figure (i.e. Figure 1.4) for final version of the EM&A manual.	This information is not available at this stage and will be provided during detailed design and construction stage.

Comments Received	Consultant's Responses
5.2b Water Quality (Section 4)	
(i) *Section 4.1.1*	
Please clarify the need to have a routine monitoring of pH, SS and oil & grease for surface water at the outlets of any effluent discharge during the reclamation phases of the projects. These monitoring, however, may only be required for the license application under WPCO for any effluent discharged from the afterward constructional activities. In addition, the monitoring of temperature is not relevant to the present project.	Routine monitoring of pH, SS and oil & grease for surface water as well as monitoring of temperature for marine water will not be included in the EM&A programme as per EPD's advice. Text will be revised accordingly.
(ii) *Section 4.1.2*	
Duplicate samples from each independent sampling event are required for all parameters. Therefore, Attachment A shall be modified to meet this requirement.	Attachment A will be amended.
(iii) *Table 4.1*	
Oil & grease shall be removed from the table.	Oil & grease will be removed from the table.
(iv) *Section 4.3.3*	
The latest (19th) edition of the APHA *Standard Methods for the Examination of Water and Wastewater* shall be referred to.	Text will be amended.
(v) *Section 4.4.1*	
This section can be deleted. However, the project proponent should be reminded that surface runoff from uncovered reclaimed area should be properly managed, say by vegetation plantation. Surface runoff is also controlled under WPCO. Also, floating debris from the public dump activities can be a serious problem if there are no proper site management and debris collection are set up.	Noted and agreed. Text will be revised accordingly.
(vi) *Section 4.4.4*	
Please see paragraph 8 above.	
(viii) *Section 4.7*	
Same as Section 4.4.1, this section can be deleted.	Noted and agreed. Text will be revised.

Comments Received	Consultant's Responses
(viii) *Section 4.8* Table 4.4 should be read as follows: Table 4.4 Action and Limit Levels for Marine Water Quality	Table 4.4 will be amended accordingly.

Parameters	Action	Limit
DO in mg/l (Surface, Middle & Bottom)	Surface & Middle 5%-ile of baseline data for surface and middle layer. Bottom 5%-ile of baseline data for bottom layer	Surface & Middle 4 mg/l or 1%-ile of baseline data for surface and middle layer Bottom 2 mg/l or 1%-ile of baseline data for bottom layer
SS in mg/l (depth-averaged)	95%-ile of baseline data or 120% of upstream control station's SS at the same tide of the same day	99%-ile of baseline, or 130% of upstream control station's SS at the same tide of the same day and specific sensitive receiver water quality requirements (e.g. required suspended solids level for concerned sea water intakes)
SS in mg/l (at station W4)	10 or 120% of upstream control station's SS at the same tide of the same day	20 or 130% of upstream control station's SS at the same tide of the same day
Turbidity (Tby) in NTU (depth-averaged)	95%-ile of baseline data or 120% of upstream control station's Tby at the same tide of the same day	99%-ile of baseline or 130% of upstream control station's Tby at the same tide of the same day

Comments Received	Consultant's Responses
Notes: - "depth-averaged" is calculated by taking the arithmetic means of reading of all three depths. - For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits. - For SS and Tby, non-compliance of the water quality limits occurs when monitoring result is higher than the limits. - All the figures given in the table are used for reference only and the EPD may amend the figures whenever it is considered as necessary.	
Please modify Table 4.5 may need to be modified to include the IC(E). You may refer to page 22 of the attached draft Generic EM&A Manual for a typical event and action plan for water quality.	Table 4.5 will be amended.
5.2c <u>Reporting (Section 7)</u>	
(i) The monitoring period for the captioned project can be shortened, i.e., instead of a period of four and half year, the length of the monitoring period can be revised according to the work programme of seawall and be depended on the results of statistical analyses of the retrieved data. Should the monitoring results indicated that there is no adverse impact arise from the public dump and reclamation activities three months after the completion of above-water seawall, the monitoring work can be suspended. As a results, Section 7.4 should be replaced by the following Section: "7.4 Annual/Final EM&A Review Reports 7.4.1 The annual/final EM&A report should contain at least the following information: (a) Executive Summary (1-2 pages); (b) drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations; (c) basic project information including a synopsis of the project organisation, contacts of key management, and a synopsis of work undertaken during the course of the project or past twelve months; (d) a brief summary of EM&A requirements including: (i)environmental mitigation measures, as recommended in the project EIA study final report; (ii)environmental impact hypotheses tested; (iii)environmental quality performance limits (Action and Limit Levels);	Noted and agreed. Text will be amended accordingly

Comments Received	Consultant's Responses
(iv)all monitoring parameters; (v)Event-Action Plans; (e) a summary of the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project EIA study report, summarized in the updated implementation schedule; (f) graphical plots and the statistical analysis of the trends of monitored parameters over the course of the project, including the post-project monitoring (or the past twelve months for annual reports) for all monitoring stations annotated against; - the major activities being carried out on site during the period; - weather conditions during the period; and - any other factors which might affect the monitoring results; (g) a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels); (h) a review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate; (i) a description of the actions taken in the event of non-compliance; (j) a summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken; (k) a summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislation, locations and nature of the breaches, investigation, follow-up actions taken and results; (l) a review of the validity of EIA predictions and identification of shortcomings in EIA recommendations; and (m) a review of the effectiveness and efficiency of the mitigation measures; (n) a review of success of the EM&A programme to cost effectively identify deterioration and to initiate prompt effective mitigatory action when necessary."	

	Comments Received	Consultant's Responses
	(ii) For the baseline, first and subsequent monthly EM&A report, the following information should be provided: - name of laboratory and types of equipment used and calibration details; - QA/QC results; - Project organisation including key personnel contact names and telephone numbers; and - Works undertaken during the month with illustrations (such as location of works, daily dredging/ filling rates, percentage fines in the fill material used).	Text will be amended accordingly.
5.2d	Waste Please amend the 3rd point of para. 5.0.2 as follows: "Construction waste should be sorted on site into non-inert (C&D waste) and inert (public fill) fraction for reuse and recycling as far as practical. Non-inert fraction containing no more than 20% by volume of inert content can be disposed of at landfills, whilst the inert fraction (such as soil, rock, asphalt, concrete, brick building debris, etc.) should be delivered to public fills or other reclamation sites."	Text will be amended accordingly
6	Fire Services Department Date: 31 December 1997 Ref: (9) in FSD 2/790/78 VII	
6.1	Please be advised that I have no specific comment on both the draft EM&A Manual and draft EIA Executive Summary for the captioned project.	Noted.
7	Highways Department Date: 9 December 1997 Ref: ( ) in HNT 713/TW/24 V	
7.1	I refer to your above quoted letter dated 2.12.1997 and have no comment on the Draft EM&A Manual and Draft Executive Summary for the above EIA study.	Noted.
8	Highways Department Date: 5 January 1998 Ref: HYDT 12/13/17	
8.1	I have no comment on the above drafts.	Noted.

	Comments Received	Consultant's Responses
9	Highways Department Date: 5 January 1998 Ref: ( ) in RD 7/3/2 pt 7	
9.1	I have no comment.	Noted.
10	Hong Kong Housing Authority Date: 5 January 1998 Ref: HD(P) 7/2/TW1/1 VII	
10.1	Please note that I have no comment on the captioned documents. My apology for the late reply.	Noted.
11	Kowloon Canton Railway Corporation Date: 22 January 1998 Ref: WRMS-001876	
10.1	As per request, this letter is to confirm that KCRC have no comments on the subject report.	Noted
12	Lands Department, District Lands Office, Tsuen Wan Date: 17 December 1997 Ref: (32) in DLO/TW 5/155/90 VII	
12.1	I have no comments on your draft EM&A Manual and draft EIA Executive Summary.	Noted
13	Marine Department Date: 12 December 1997 Ref: (3) in PA/S 909/110/1/1 (11)	
13.1	*Page 4/2, Para 4.2.6* The GPS will give a fair accuracy up to about ± 100 metres. However, if you wish, you may consider to use Differential Global Positioning System (DGPS) which will give a much higher accuracy of about ±2 metres only.	Thank you for your advice. DGPS will be recommended in the final report.

	Comments Received	Consultant's Responses
14	Planning Department Date: 6-12-1997 Ref: ( ) in PD/TKS D/TWC/002	
14.1	No comment please.	Noted
15	Regional Services Department Date: 22 November 1997 Ref: (17) in RSD 1/HQ 714/78 (7) VIII	
15.1	We have no comments on the above subject please.	Noted.
16	Transport Department Date: 5 December 1997 Ref: NR 171/200-58	
16.1	I have no further comments on the draft reports.	Noted.
17	Water Supplies Department Date: 24 December 1997 Ref: (21) in WSD 3052/44/80 Pt. 11	
17.1	*Sec 1.3.6, p.1/5, Sec 1.5.1, p.1/6 & Fig. 1.5, Sec 4.9.1 & 4.9.2, p.4/9* Effective remedial measures should be taken to minimize the effects due to dredging/reclamation/ construction activities to maintain the seawater quality at the intake of S.W.P/S within WSD's WQOs for flushing at all times. Such activities should be slowed down or suspended if necessary. The frequencies of dredging/reclamation/construction activities near the intake of WSD's S.W.P/S should be minimized and preferably to be carried out in the dry season and during non-peak hours when the abstraction rate at the S.W.P/S is low. A schedule of dredging/reclamation activities near the intake of the S.W.P/S should be provided to WSD.	Noted and agreed. This recommendation will be included in the final report.

	Comments Received	Consultant's Responses
17.2	*Sec 4.1.1, 4.1.2, p.4/1, Sec 4.6.1, p.4/4* Also, turbidity should be carried out on daily basis during dredging/filling/reclamation activities, results should be faxed to WSD for information.	This recommendation will be included in the final report. However, please note that the proposed water quality monitoring period for the captioned project is now shortened, i.e., instead of a period of four and half year, the length of the monitoring period will be revised according to the work programme of seawall and be depended on the results of statistical analyses of the retrieved data. Please refer to EPD's comments (Items 5.1a and 5.2c)
17.3	*Sec 4.8, Table 4.4, p.4/7* The proposed action level of 120% and limit level of 130% for turbidity and suspended solids at upstream control station's are not acceptable for WSD seawater intake. For information, the average turbidity recorded at the intake of Tsuen Wan S.W.P/S for 96/97 is 4.0 NTU. Seawater quality at intake must be maintained within WSD's WQOs for flushing purpose. The action level of 10 mg/l and limit level of 20 mg/l for SS, and action level 10 NTU and limit level 20 NTU for turbidity should be adopted for the seawater intake of WSD's S.W.P/S.	The action level of 10mg/l and limit level of 20mg/l for SS, and action level of 10 NTU and limit level 20 NTU for turbidity will be adopted at the WSD's intakes in Table 4.1. However, we consider that if the measured results exceed these levels but are still within a certain percentage of the values measured at the upstream control station (ie action level of 120% and limit level of 130%), it is unlikely that these exceedances are caused by construction activities carried out for the captioned project.
17.4	*Sec 4.7, Table 4.3, p.4/6, Sec 4.8, Table 4.5, p.4/8* Whenever limit level near the WSD seawater intake being exceeded, WSD should also be informed. Effective mitigation measures should be implemented as soon as possible. Dredging/reclamation activities should be slowed down or suspended if necessary.	Noted and agreed. We will incorporate this in Table 4.2.
17.5	*Sec 4.9.1, p.4/9* Effective remedial measures should be taken to minimize the effects due to dredging/reclamation/ construction activities to maintain the seawater quality at the intake of S.W.P/S within WSD's WQOs for flushing at all times. Such activities should be slowed down or suspended if necessary.	Noted and agreed. We will incorporate this in Table 4.2