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 6 : EIA FINAL ASSESSMENT REPORT**

卷六：環境影響評估最後報告

Issue 2
May 1998


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

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Shankland Cox Ltd 森蘭郭斯
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# AGREEMENT NO. CE 26/94
# TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
# ENVIRONMENTAL IMPACT ASSESSMENT FINAL ASSESSMENT REPORT

## FINAL

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# 1 INTRODUCTION

## 1.1 Background

1.1.1 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.

1.1.2 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.

1.1.3 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.

1.1.4 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.

1.1.5 The site is located in an embayment at the northern end of Rambler Channel. The bay currently serves a Public Cargo Working Area (PCWA) and is a Dangerous Goods Anchorage (DGA). Both of these activates 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 Objectives

1.2.1 The objectives of the Environmental Impact Assessment (EIA) Final Assessment Report (FAR) are as follows:

- to characterise the existing environment and the sensitive receivers;
- to provide an emission source inventory for the study area;
- to assess the environmental impacts arising from the reclamation and development on the reclaimed land, during both construction phase and operational phase; and
- to recommend mitigation measures to minimise and contain the predicted environmental impacts.

## 1.3 Scope

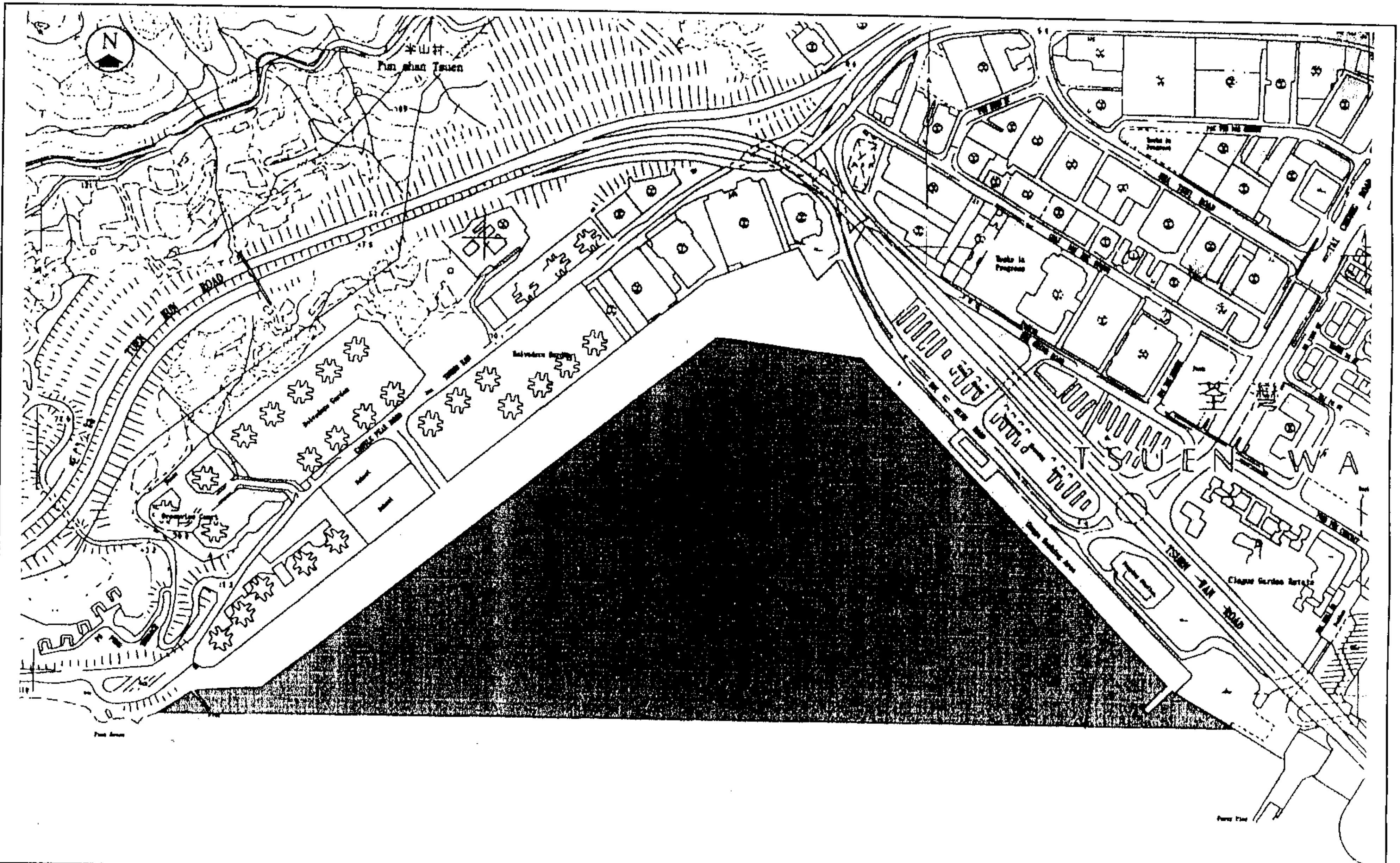
1.3.1 The scope of works for the FAR include assessment of air quality impacts, water quality impacts, effect of reclamation, noise, waste and hazard to the population on the reclamation relating to the Yau Kom Tau Water Treatment Works (YKT WTW) which is a designated Potentially Hazardous Installation (PHI).

1.3.2 A review of the potential noise impact related to the relocation of the PCWA to Stonecutters Island were discussed in another working paper.

1.3.3 Since relocation of the TWB DGA to Ma Wan is still under review at the time of writing of this EIA report, assessment related to the relocation of the TWB DGA will be covered in a separate report.

## 1.4 Report Structure

- **Chapter 1** presents the project background and introduction;
- **Chapter 2** outlines the Master Development Plan (MDP) proposed for the areas;
- **Chapter 3** gives the methodology and criteria for the environmental assessment;
- **Chapter 4** describes the physical features of the existing environment, background levels of key parameters, the emission sources and the sensitive receivers;
- **Chapter 5** presents the assessment results for construction noise, operational noise and industrial noise. Recommendations and mitigation measures are also provided in this section where appropriate;
- **Chapters 6 and 7** presents the assessment results and the mitigation proposals for air quality and water quality respectively;
- **Chapter 8** presents the assessment results for solid waste and mud contamination;
- **Chapter 9** gives the risk assessment results and its implications; and
- **Chapter 10** summarises the key findings and recommendations of the assessment.




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

THE STUDY AREA

FIGURE 1.1

SCALE NOT TO SCALE

# 2 PROJECT DESCRIPTION

## 2.1 The Master Development Plan (MDP)

2.1.1 This chapter presents the MDP for the new development areas, which is extracted from the Investigation Final Report of the study for ease of reference. A schedule of uses and areas is outlined for each of the proposed uses, together with a breakdown of population and employment. The land use proposals are described for each of the Planning Areas and a preliminary assessment of the phasing is outlined. The text should be read in conjunction with the MDP shown in **Figure 2.1**.

2.1.2 The MDP presented in subsequent sections is slightly different to the MDP that was presented in the Draft Investigation Final Report, on which this EIA report was based. The revision of the MDP was arisen due to the fact that the southern reclamation limit was extended slightly south after submission of the Draft Investigation Final Report. About 2 hectares of additional land is made available, and the floor areas provided on the reclamation are increased. Nevertheless, the traffic flow and population distribution on the reclamation remain the same, and findings in this EIA report are still valid for the revised MDP. The previous version of the MDP presented in the Draft Investigation Final Report is also shown in **Figure 2.2** for ease of comparison. The MDP also shows the new reclamation line that has been adopted in the hydraulic study.

## 2.2 Schedule of Uses and Areas

2.2.1 **Figure 2.1** illustrates the MDP proposals for the new development area. **Table 2.1** outlines the schedule of uses and areas for the proposed land uses.

Table 2.1 MDP: Schedule of Uses and Areas

| Use | Zoned Area (ha) | % Land Area |
|---|---|---|
| 1 Residential | | |
| Public Rental | 3.12 | 10.10 |
| PSPS | 5.16 | 16.64 |
| R1 | 5.60 | 18.06 |
| Residential Total | 13.88 | 44.80 |
| 2 Commercial | 1.53 | 4.94 |
| 3 Open Space | 6.20 | 20.00 |
| 4 Institution and Community | 0.26 | 0.84 |
| 5 Educational | 2.63 | 8.48 |
| 6 Road Reserve | 4.60 | 14.84 |
| 7 Amenity | 1.90 | 6.10 |
| Total | 31.00 | 100.00 |

2.2.2 The land use proposals for the new development areas cover a total area of 31.0 hectares. The new development areas include proposed reclamation and land which is currently used as cargo working area. Approximately 45% of the proposed development area is occupied by housing and 20% by open space. Commercial development sites provide about 5% of the total land use budget, and educational uses approximately 8.5% of the total land area.

2.2.3 The road reserve for the MDP occupies 4.60 hectares (14.84%) of the total site area and approximately 2 hectares have been reserved as amenity area.

## 2.3 Housing and Population by Housing Type

2.3.1 **Table 2.2** outlines the assumptions that have been used to calculate the development capacities of residential sites in the new development area.

**Table 2.2 MDP: Residential Development Assumptions**

| Use | Planning Area | Development Ratio | Plot Ratio | GFA per flat ($m^2$) | Persons Per Flat |
|---|---|---|---|---|---|
| Public Rental | 104A | 7 | | 55 | 3.12 |
| PSPS | 101A, 102A | | 5.0 | 60 | 2.50 |
| R1 | 103A | | 5.0 | 93 | 2.50 |

2.3.2 A development ratio of 7 has been assumed for the rental housing area which is the maximum permitted under Chapter 2 of the Hong Kong Planning Standards & Guidelines (HKPSG). A plot ratio of 5.0 is assumed for both the PSPS and the R1 development sites which reflects the maximum permitted plot ratios for these uses by the HKPSG for the Tsuen Wan area.

2.3.3 Gross floor areas per flat have been derived from existing flat sizes in the Tsuen Wan area. For the rental housing sites, the persons per flat (PPF) assumption for 2011 is based upon Chapter 2 of the HKPSG. For private housing sites, the Territorial Development Strategy medium term strategy has forecast the PPF to be 2.44 in the Tsuen Wan area for 2011. This figure has also been used for forecasting the PPF for PSPS development within the proposed reclamation area. The average flat size for the R1 development is at the upper end of the range of private sector flat sizes in Tsuen Wan.

2.3.4 **Table 2.3** outlines the distribution of planned population in the new development by housing type. The allocated areas can accommodate a total population of approximately 29,700 by 2011 on the basis of the assumptions outlined in **Table 2.2**. The projection of 30,000 is consistent with the population forecast for this area in the Tsuen Wan/Kwai Tsing Development Statement and also the TDS Medium Term Development Strategy.

2.3.5 Significant uncertainties do however surround several of the matters about which assumptions have been made in estimating population capacity. In particular, the conceptual layouts are to be tested in terms of environmental conditions. Furthermore, persons-per flat ratios are critical to the estimation of population capacity but are outside the control of government. The same is true of average GFA per flat in private sector developments. It is therefore prudent to assume that the population capacity of the new development area is approximately 30,000.

2.3.6 The land area reserved for public rental housing and PSPS development is 8.28 hectares in the MDP. This could accommodate a population of 21,968 people which represents about 75% of the total forecast population in the new development area.

2.3.7 Private residential land contributes 5.60 hectares to the MDP land use budget and is forecast to accommodate approximately 7,300 people or 25% of the total population within the new development area. **Table 2.3** presents the population by housing type.

**Table 2.3 MDP: 2011 Population by Housing Type**

| Use | Area (ha) | Flats | Population | Mix % |
|---|---|---|---|---|
| 1. Residential | | | | |
| Rental | 3.12 | 3,600 | 11,232 | |
| PSPS | 5.16 | 4,400 | 10,736 | |
| Sub-total | 8.28 | 8,000 | 21,968 | 75 |
| R1 | 5.60 | 3,000 | 7,320 | 25 |
| Total | 13.88 | 11,000 | 29,288 | 100 |

2.3.8 Priority is given in the early phase of development (Area 104) to the provision of land for public housing (see Section 2.9).

## 2.4 Employment

2.4.1 **Table 2.4** outlines the assumptions that have been used to calculate GFA and employment in office, retail and hotel development proposals within the new development area.

**Table 2.4 MDP: Employment Assumptions**

| Use | Plot Ratio | Employment Density per Worker |
|---|---|---|
| Office | 9.5 | 20 |
| Retail | 9.5 | 20 |
| Hotel (1) | 9.5 | 20 |
| R1 retail | 0.05 | 20 |
| Rental retail | 0.42 $m^2$ per person | 20 |
| PSPS | 0.42 $m^2$ per person | 20 |

Note: (1) 500 rooms per hotel and 1.5 employees per room assumed.

2.4.2 A plot ratio of 9.5 is assumed for the commercial site which is the maximum non-domestic plot ratio which is permitted on the reclamation area.

2.4.3 Within the rental and PSPS developments, retail floor space is estimated to be provided at a rate of 0.42 $m^2$ per person. This guideline has been adopted from the HKPSG. Employment within the commercial and retail areas is forecast to be 20 $m^2$ per person.

2.4.4 **Table 2.5** shows that 8,104 job places are forecast within the proposed development areas for 2011. The main sources of employment will be the office, hotel and retail centres located close to the proposed KCRC rail station. Employment will also be generated by the retail development in residential sites and also in schools.

2.4.5 The MDP illustrates a commercial land area of 1.53 hectares up to the Study Area Boundary. For transport testing, a commercial site of 2 hectares has been assumed to reflect the development potential of the 0.47 hectare site located immediately outside the south eastern corner of the study area.

**Table 2.5 MDP: Employment 2011**

| Use | GFA (m2) | Employment |
|---|---|---|
| 1. Retail GFA in Residential Zones | | |
| Rental | 5,300 | 265 |
| PSPS | 4,620 | 231 |
| R1 | 2,800 | 140 |
| Residential Total | 12,720 | 636 |
| 2. Commercial | 75,350 | 3,768 |
| Office/ | 40,000 | 2,000 |
| Retail Centre | 30,000 | 1,500 |
| Hotels | | |
| Commercial/Hotel Total | 145,350 | 7,268 |
| 4. Institutional / Community | | |
| 5. Educational | | 200 |
| Total | 158,070 | 8,104 |

## 2.5 Open Space

2.5.1 The MDP illustrates the provision of 6.20 hectares of open space within the new development area. Three main areas of open space are provided. These are the waterfront promenade (2.9 ha), an area of both passive and active open space in Area 101 (2.3 ha) (which includes the provision of a local park) and an area of passive open space in Area 102 (1 ha). Together, these areas provide open space areas to serve both incoming and existing residents / workers.

2.5.2 **Figure 2.3** illustrates both the elevated and ground level pedestrian links in the MDP which provide links from the proposed development area to the adjacent urban areas. Priority has been given to providing an elevated walkway from the Belvedere Garden area to the proposed KCRC station through the new development areas.

## 2.6 Schools

2.6.1 Schools are required to serve the incoming population in accordance with the HKPSG. **Table 2.6** sets out the standards of provision for schools that require dedicated land areas in the MDP, together with the number of facilities that are provided.

**Table 2.6 MDP: Provision of School Sites**

| G/IC Facilities | Standard of Provision | Site Area Required | No. in MDP | Total Land Area (ha) |
|---|---|---|---|---|
| Primary School | 1 per 975 people in the 6-11 age-group (HKPSG). MDP assumes 6% of total population will require primary school provision. | 6,200 | 2 | 1.24 |
| Secondary School | 1 per 1,350 people in the 12-18 age group (HKPSG). MDP assumes 8% of the total population will require secondary school provision. | 6,950 | 2 | 1.39 |

2.6.2 The MDP reserves 2.63 hectares for school sites to provide the 4 schools required to meet the HKSPG requirements.

## 2.7 Transport Facilities

*Road*

2.7.1 The MDP illustrates the trunk, primary distributor and local roads provided within the proposed network. A tunnel bypass is located to the west of Areas 101 and 102 and provides a 'through route' for traffic between Castle Peak Road and Tsuen Wan Road. Hoi On Road distributes traffic to and from Castle Peak Road to the proposed reclamation area via Road D1 and Road L1. The east of the reclamation area is connected to Hoi Hing Road via Road D2 and L2.

2.7.2 Access into the development sites is provided from Roads D3, L1, L2 and L3. There is no access from Roads D1 and D2 for safety and highway design considerations.

*Rail*

2.7.3 The proposed KCRC rail station is located to the north of the commercial development in Area 105. While the MDP takes account of the proposed location of the KCRC station, it is not required to undertake an assessment of the development potential of the land area in the vicinity of the station.

2.7.4 The MDP incorporates the co-ordinates for the Tsuen Wan West station platforms and adjacent rail alignment as provided by KCRC. The MDP also illustrates the minimum reclamation line proposed by KCRC for the West Rail Study.

*Bus Terminus and Ferry Piers*

2.7.5 A bus terminus is proposed to be incorporated within the commercial development in Area 105 at the proposed station development nodes, to provide an efficient public transport interchange facility.

2.7.6 The position of the China Ferry Terminal (CFT) is assumed to be located adjacent to the commercial development site outside but immediately adjacent to the south eastern boundary of the Study Area. While the study is not required to assess the requirements of introducing a CFT at this location, the interface between the CFT and the adjacent land uses positioned in the Study Area has been a key consideration. The CFT is proposed to incorporate a passenger ferry pier which replaces the existing ferry pier located at the existing waterfront, subject to certain technical issues, such as immigration control and traffic conflicts between river-trade and local ferries, and other interface issues, being satisfactorily resolved later.

## 2.8 Utilities

2.8.1 Land uses are reserved in the MDP for the provision of drainage reserves and a salt water pumping station. The latter is a KCRC proposal to replace the existing facility which will be affected by the proposed rail scheme. Utilities are also proposed within the existing urban areas located within the Study Area boundary.

2.8.2 The Electricity Substation (ESS) site at the junction of Hoi Hing Road and Hoi Shing Road will be affected by the proposed alignment of the tunnel bypass. A site of 0.1 hectares for the reprovisioning of this is shown on the MDP south of Hoi Shing Road. Immediately adjacent to the proposed China Light and Power (CLP) sub-station, a site of 0.06 hectares has been reserved for a sewage pumping station. Both sites are currently zoned I on the Government ODP and are recommended for rezoning to 'Other Use' and 'Government Use' respectively. The former would provide a suitable alternative site which is required to facilitate the tunnel bypass proposals.

2.8.3 The ESS site located north of Hoi Shing Road is retained in the MDP.

2.8.4 The MDP illustrates the location of the existing Water Supplies Department (WSD) salt water pumping station along the waterfront to the south of Tsuen Wan Road. This site will be affected by the proposed alignment of the West Rail. An alternative location for reprovisioning this facility is provisionally initiated in the MDP along the existing shoreline in Area 105. The suitability of this site for future use as a salt water pumping station will be considered by KCRC and WSD.

2.8.5 An 'IC' site is shown on the ODP adjacent to the exiting salt water pumping station. This site is reserved for an Indoor Games Hall. An alternative site of this use will be provided adjacent to the Belvedere Garden Department.

2.8.6 The MDP assumes that the existing cargo working area will be reprovisioned in Stonecutters Island.

2.8.7 A refuse collection point is proposed to be located within each site within the proposed development area.

## 2.9 Development Phasing

2.9.1 **Figure 2.4** illustrates a preliminary phasing programme for the new development area. The programme is divided into the five planning areas and commences with site preparation work in area 104 and concludes with construction work in Area 103.

2.9.2 **Table 2.7** illustrates the population and employment build-up for each Area.

**Table 2.7 Preliminary Development Phasing: Population and Employment Build-up**

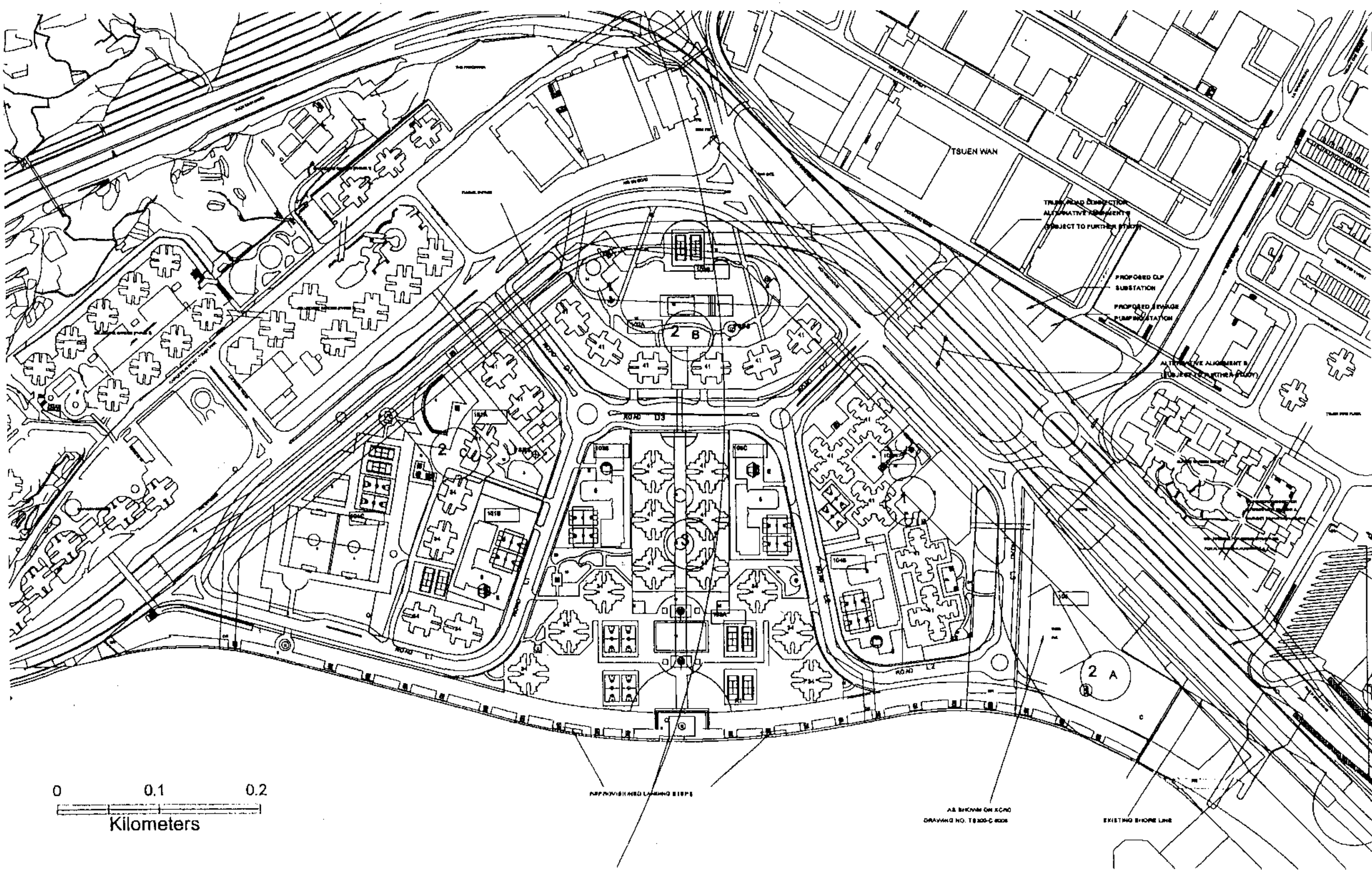
| Area | Occupation Date | Population (by phase) | Cumulative Population Build-up | Employment (by phase) | Cumulative Employment Build-up |
|---|---|---|---|---|---|
| 104 (Rental) | 2008/2009 | 11,232 | 11,232 | 365 (Notes) | 365 |
| 101/102 (PSPS) | 2009/2010 | 10,736 | 21,968 | 331 (Notes) | 696 |
| 105 (Com) | 2009/2010 | - | | 7,268 | 7,964 |
| 103 (RI) | 2009/2010 | 7,320 | 29,288 | 140 | 8,104 |

Notes: Includes Employment assumptions for school sites within each area.

2.9.3 **Figure 2.5** 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. Details of the programme can be refer to **Table 7.1** of this report.

- 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 sand filling activities within the reclamation site would also commence at this stage.

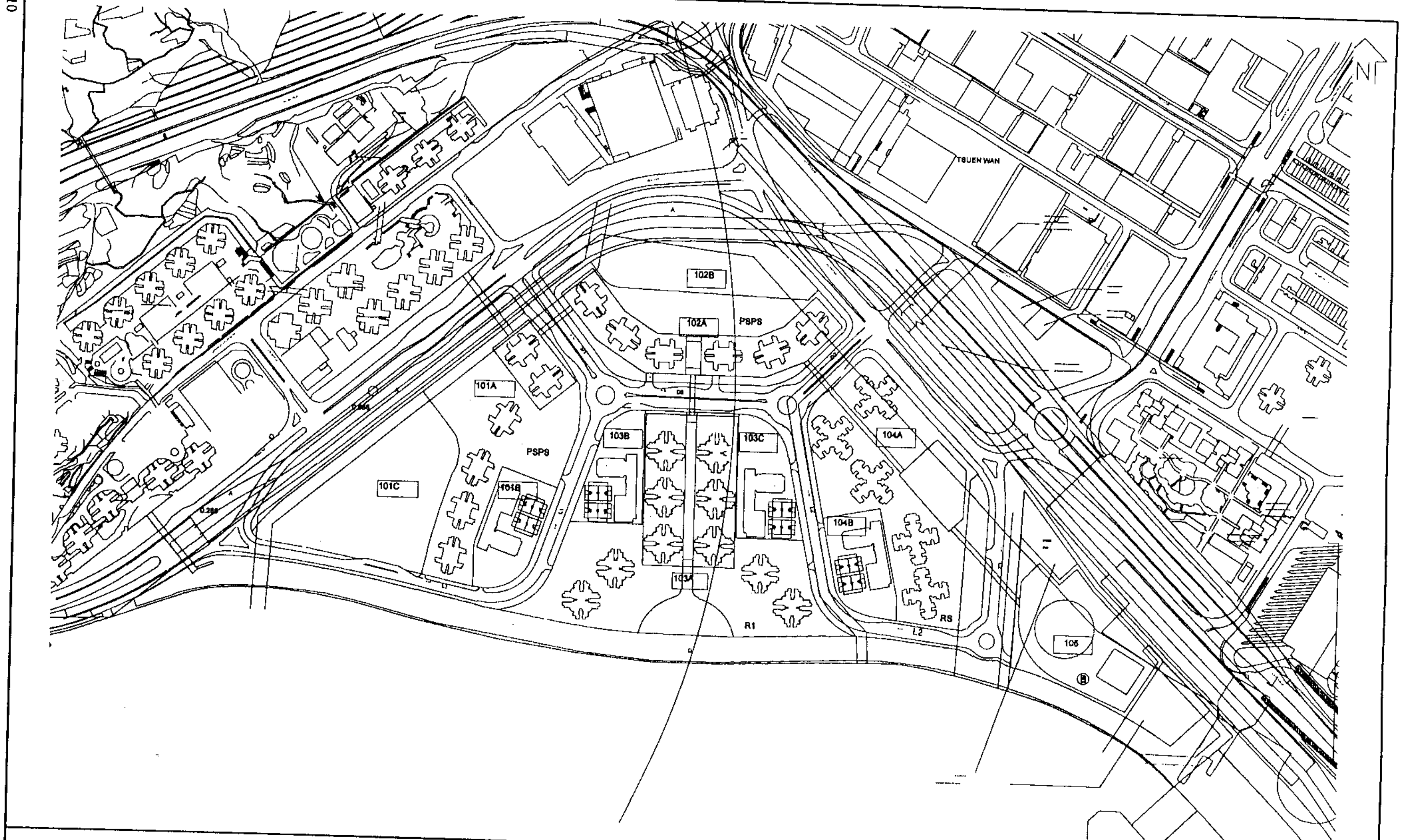
- Subsequently, the reclamation work would be undertaken in another four phases (Phases II to V). For each phase, dumping and sandfilling work would be confined to only part of the site area behind the submerged seawall; placement of surcharge and land development would then follow.




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

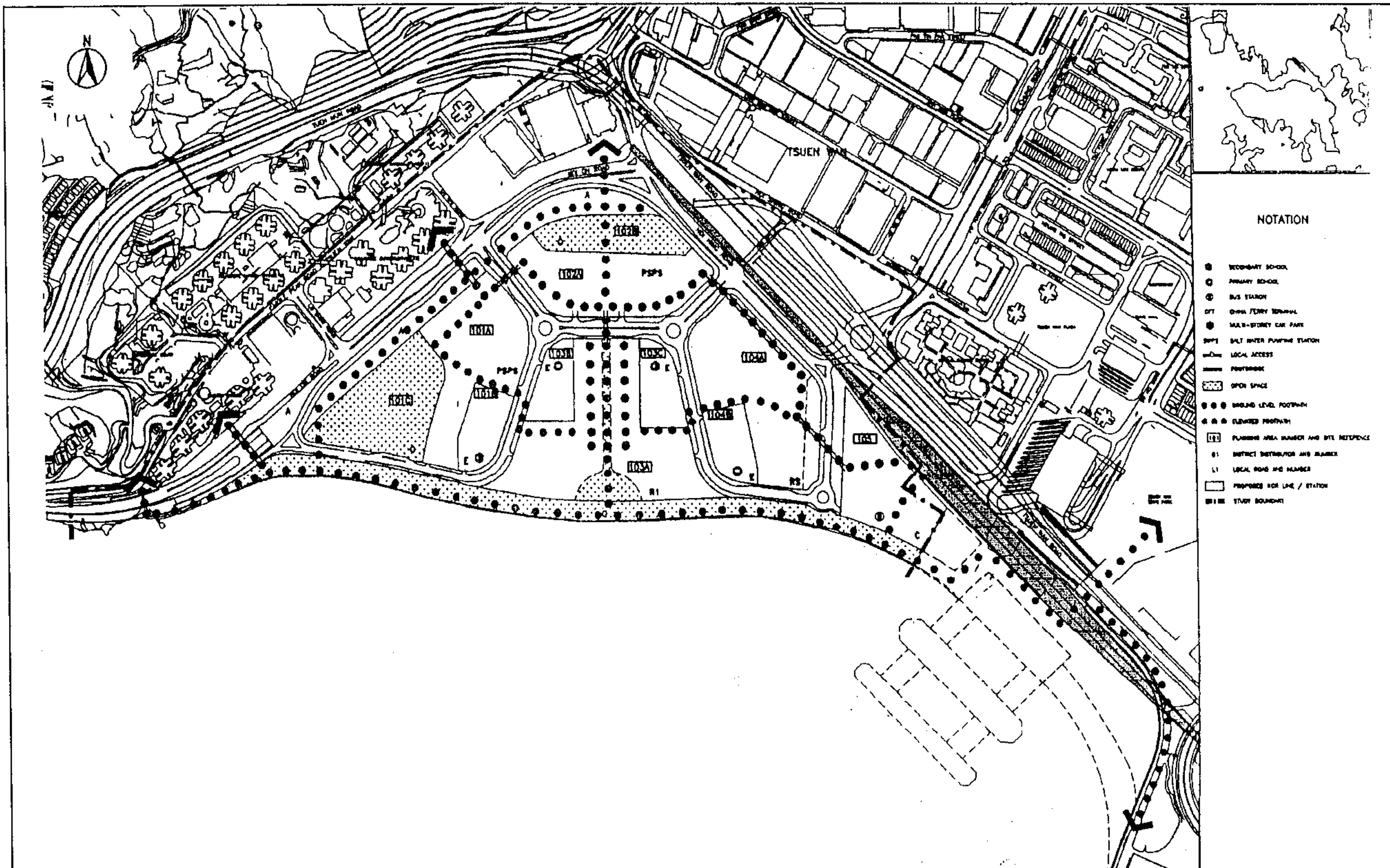
MASTER DEVELOPMENT PLAN (NEW VERSION AS PRESENTED IN THE INVESTIGATION FINAL REPORT)

| | |
|---|---|
| FIGURE | 2.1 |
| SCALE | 1 : 5500 |




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
MASTER DEVELOPMENT PLAN (PREVIOUS VERSION AS PRESENTED IN THE INVESTIGATION DRAFT FINAL REPORT)

| | |
|---|---|
| FIGURE | 2.2 |
| SCALE | 1 : 5500 |

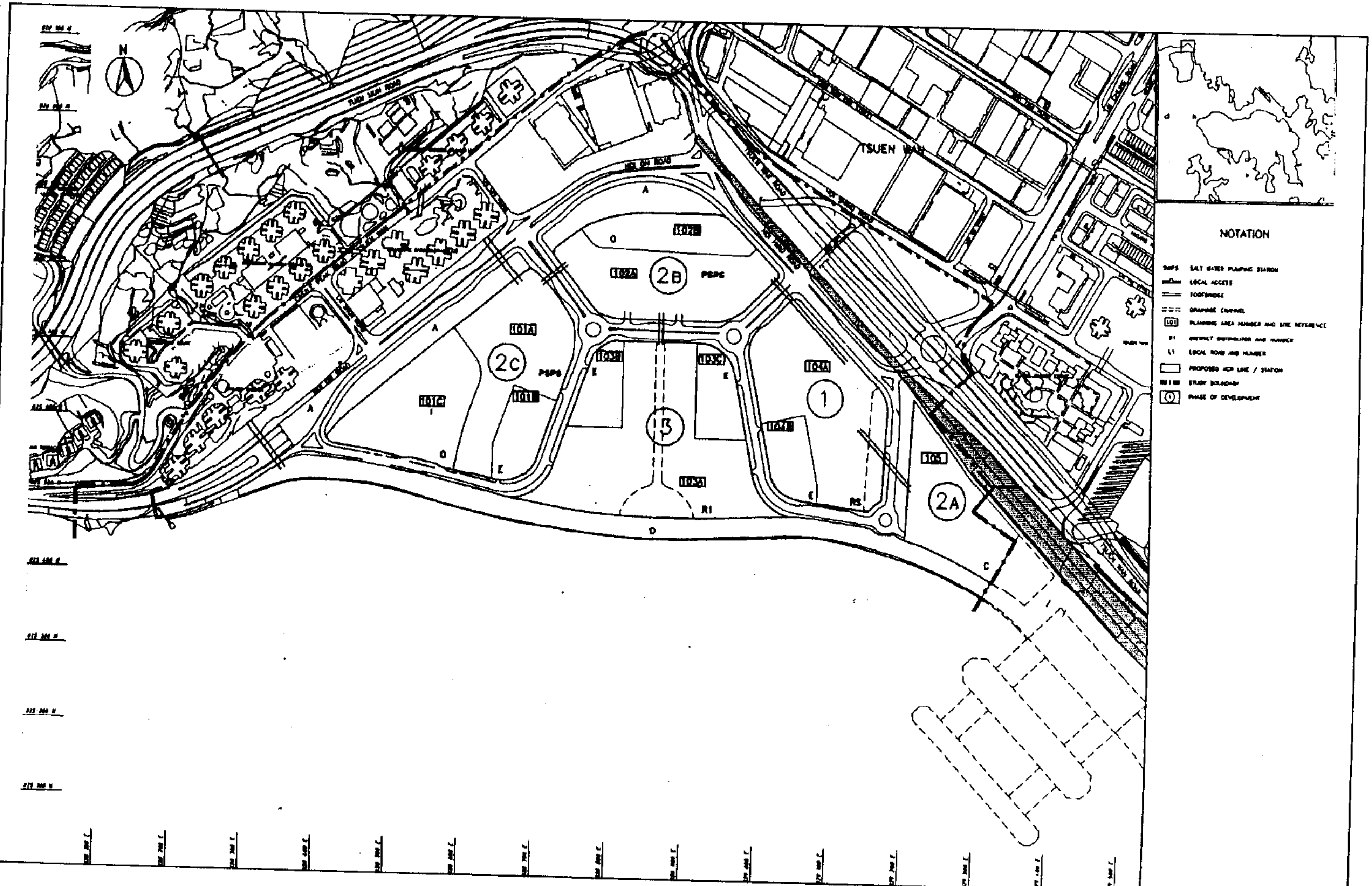



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

PEDESTRIAN CIRCULATION

FIGURE 2.3

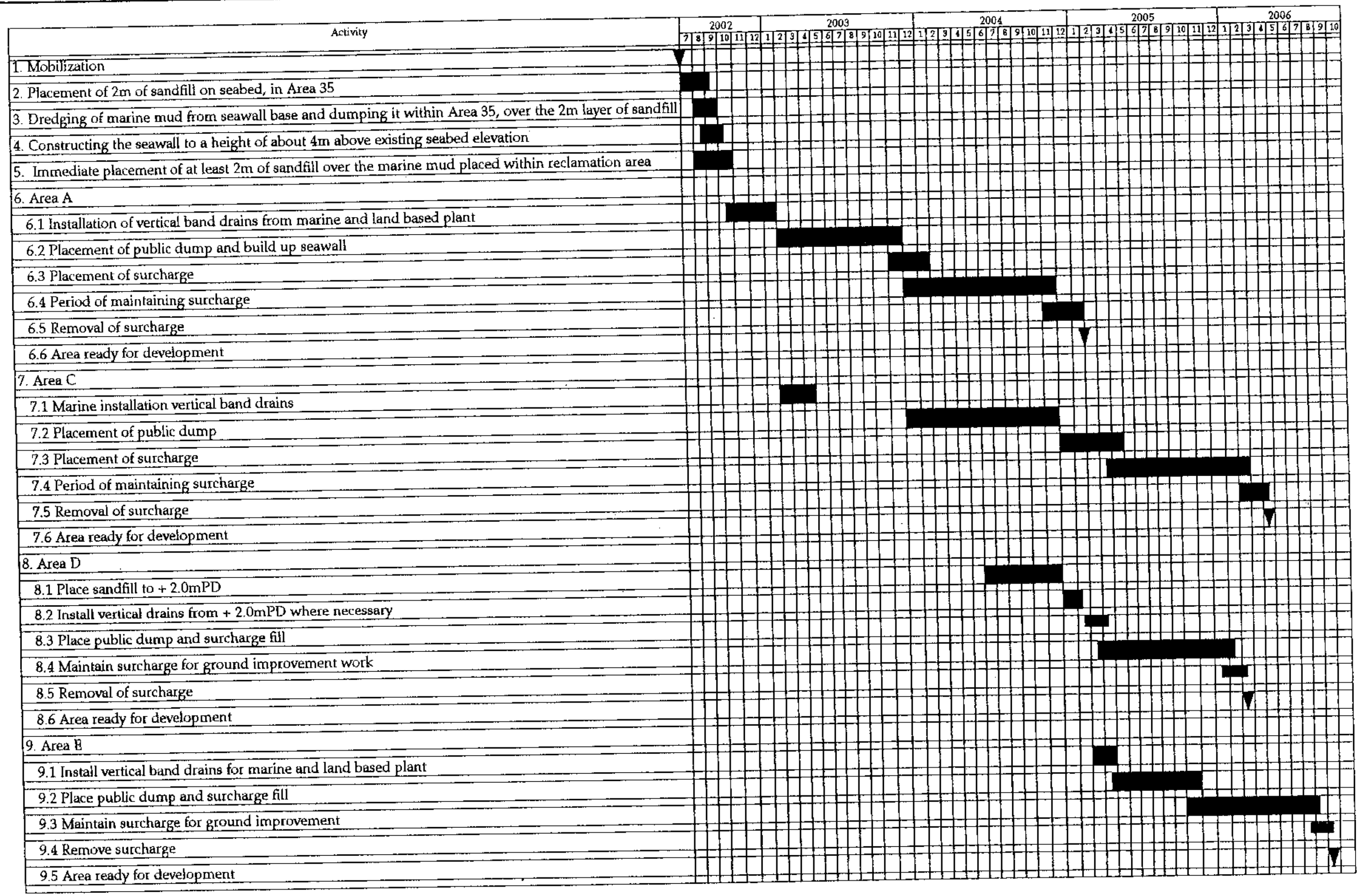
SCALE NOT TO SCALE




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
PHASING OF DEVELOPMENT

FIGURE 2.4

SCALE NOT TO SCALE




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

# TENTATIVE PROGRAM OF WORK FOR THE RECLAMATION

FIGURE 2.5

SCALE NOT TO SCALE

# 3 METHODOLOGY AND ASSESSMENT CRITERIA

## 3.1 Introduction

3.1.1 The Air Pollution Control Ordinance defines statutory ambient air quality objectives (AQOs), the Noise Control Ordinance (NCO) defines construction and fixed noise limits, and the Water Pollution Control Ordinance (WPCO) defines statutory water quality objectives. Other criteria, such as the Hong Kong Planning Standards and Guidelines (HKPSG) and the ExCo eligibility criteria, are also adopted, particularly with reference to traffic noise impacts.

## 3.2 Construction Noise

3.2.1 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*.

3.2.2 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 criteria were adopted for the current assessment, since it is understood that all normal works will be restricted to day time hours on normal weekdays.

## 3.3 Operational Noise

*Existing Legislation*

3.3.1 There are currently no statutory controls to limit traffic noise impacts. HKPSG recommend that road traffic noise should not exceed the following standards:

**Table 3.1 Hong Kong Planning Standards and Guidelines: Road Traffic Noise**

| Use | Road Traffic Noise dB(A) |
|---|---|
| Domestic premises | 70 |
| Offices | 70 |
| Educational institutions including kindergartens and nurseries | 65 |
| Hospitals, clinics, convalescences and homes for the aged | 55 |

Notes: 1 The above standards apply to uses which rely on opened windows for ventilation.
2 Facade noise levels in terms of $L_{10}$ (peak hour)

*Methodology*

3.3.2 Noise assessment calculations were carried out using the UK Department of Transport 'Calculation of Road Traffic Noise', 1988 (CRTN). In the absence of traffic model results for future years, the year 2011 traffic data, which is the best available information in respect of traffic flow prediction, has been used in this noise assessment. These traffic data were provided in the *Tsuen Wan Bay Further Reclamation Area 35 - Investigation Final Report*, Appendix C. Design speeds, rather than predicted speeds, have been used in the assessment. Calculations were performed at every sixth floor level for the residential blocks, starting from the first floor.

*Noise Sensitive Receivers (NSRs)*

3.3.3 Existing NSRs have been identified by reviewing survey plans and through site visits. Future NSRs have also been identified from the MDP. Where more than one dwelling or building is expected to be subjected to a similar predicted noise level, a representative receiver has been chosen for the traffic noise impact assessment.

*Mitigation Measures*

3.3.4 For existing NSRs exposed to noise from new roads, direct technical remedies are considered to reduce traffic noise to HKPSG standards as far as practicable. Any facade that cannot be protected by practicable direct technical remedies to meet the HKPSG noise limit is examined for the eligibility of indirect technical remedies under the ExCo decision (XC(89)157, *Equitable Redress for Persons Exposed to Increased Noise Resulting from the Use of New Roads*). Criteria are as follows:

(i) the predicted overall noise level from the new road, together with other traffic noise in the vicinity, must not be less than the HKPSG criteria;

(ii) the predicted overall noise level is at least 1.0 dB(A) more than the prevailing noise level, ie the total traffic noise level existing before the works to construct the road were commenced; and

(iii) the contribution to the increase in the predicted overall noise level from the new road must be at least 1.0 dB(A).

3.3.5 For newly-zoned NSRs exposed to noise from new roads, direct technical remedies are considered to reduce traffic noise to HKPSG standards as far as practicable. In addition, receiver mitigation, e.g., setback, self-protecting building design, use of non-sensitive podium and street frontage uses, is recommended to reduce traffic noise to HKPSG standards as far as practicable and is considered during preparation of the MDP. Indirect technical remedies are considered only as a final resort.

## 3.4 Industrial Noise

*Existing Legislation*

3.4.1 Industrial noise emissions are controlled under the statutory Noise Control Ordinance (NCO). The assessment methodology and standards are set out in the "*Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites*".

3.4.2 The Technical Memorandum classifies areas by the *Area Sensitivity Rating (ASR)* into different *Acceptable Noise Levels (ANLs)*. The ASR is a function of the type of area in which the site is located and the degree to which it is influenced by the surrounding noise environment. The study area will comprise high-rise developments in an urban area in the future, which is likely to be assigned an ASR of "B" or "C". The assessment criterion adopted for the current assessment was 5 dB(A) below the appropriate ANLs as shown in **Table 3.2** below.

**Table 3.2 Industrial Noise: Assessment Criteria**

| Time Period | ASR = B | ASR = C |
|---|---|---|
| | ANL -5 dB(A) | ANL -5 dB(A) |
| Day (0700 to 1900 hrs) | 60 | 65 |
| Evening (1900 to 2300 hrs) | | |
| Night (2300 to 0700 hrs) | 50 | 55 |

*Industrial Noise Sources*

3.4.3 Industrial noise generated by nearby industries would be a potential concern to the proposed development. The existing major industrial area in the proximity is the industrial area north of Hoi Shing Road, e.g. Lok Shan Factory Building Phase III, Cable TV, Golden Dear Industrial Centre, Shield Industrial Centre, and is basically composed of multi-storey flatted factory buildings.

*Approach of the assessment*

3.4.4 The study aimed at assessing the general industrial noise from the existing industrial areas. The influence of industrial noise depends on the type of industries, the kind of equipment involved, the position of noisy equipment and the time of operation. Noise measurements were undertaken at one location and at different time periods in order to obtain representative data on existing industrial noise. These data were used in the estimation of potential noise experienced by future developments based on general acoustic principles. Results were then compared with limits set in the relevant NCO's TM.

*Noise Measurement Method*

3.4.5 There are limitations in industrial noise measurement for the study area. Noise in the area is not solely generated from industrial activities but also from traffic on the major road (Tsuen Wan Road) and local roads (Hoi Shing Road and Hoi On Road). Furthermore, the possible of locations for noise monitoring are rather limited and restricted to ground level for most of the cases.

3.4.6 In order to avoid strong influence from traffic noise, the noise measurement point was set up respectively facing the industrial area along Hoi Shing Road (presumably this local road would be less influencing than Tsuen Wan Road). The shortcomings were that measurements could only be done at ground level and traffic would be recorded in the results. However, it was believed that it was the only practical and acceptable method to estimate the general industrial noise under the site constraints.

3.4.7 Noise monitoring points were shown in **Figure 5.7** and the noise monitoring programme is presented in **Table 3.3**. Field logs recorded during the noise monitoring and the calculation details of the noise measurement are given in **Appendix A**.

**Table 3.3 Noise Measurement Programme**

| Time Period | Measurement Time and Duration | Measurement Parameter |
|---|---|---|
| Day (0700 to 1900 hrs) | 2 weekdays<br>1 hour in the morning<br>1 hour in the afternoon | Leq(30 min) in dB(A) |
| Evening (1900 to 2300 hrs) | 2 weekdays<br>30 min | Leq(30 min) in dB(A) |
| Night (2300 to 0700 hrs) | 2 weekdays<br>30 min | Leq(30 min) in dB(A) |

*Estimation of Industrial Noise Experienced by Future NSRs*

3.4.8 Measurement results were used to estimate the noise level experienced by the sensitive receivers through extrapolation by standard acoustic principles. The equation shown below was used in calculation which corrects the distance attenuation for hemispherical radiation from a point source:

$$SPL = SWL - 20 \log r - 8 + \text{facade effect} \quad dB$$

where r = distance from the source to the assessment location (m)
SPL = sound pressure level (dB)
SWL = sound power level (dB)
facade effect = 3 dB(A)

## 3.5 Air Quality (Construction Phase)

3.5.1 The major potential air quality impact during the construction phase of the projects will be dust arising from haul road emissions, open site erosion, cut and filling operations. Civil works related to the construction of access roads will also cause dust emissions. Exhaust emissions from site vehicle and construction plant are not considered to constitute a significant source of air pollutants based on previous experience from similar construction works. In addition, there is also a potential odour impact from dredging. A qualitative assessment for odour from dredging was undertaken.

*Assessment Criteria*

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

3.5.3 There is no statutory criterion for maximum levels of odours in Hong Kong, but for the purpose of odour modelling, EPD has recommended a level of 5 odour units averaged over 5 seconds at air sensitive receivers.

*Assessment Methodology - Emissions Calculations*

3.5.4 Dust emission from the construction works will include the following:

- general construction activities (including ground excavation, cut and fill operations, construction of the facilities and equipment traffic over the site area);
- wind erosion of open site.

3.5.5 The prediction of dust emissions was based on typical values and emission factors from USEPA *Compilation of Air Pollutant Emission Factors* (AP-42), 5th Edition. The reclamation will be undertaken in five phases. Since there will be overlapping of the construction phases, it is assumed that the emissions of dust will come from the whole construction site under the worst case scenario.

3.5.6 A ten-hour working day and six-day working week were assumed during the construction phase of the project. It was assumed that a maximum of 30 percent of the construction site area will be actively operated at any one time during the construction period. In this assessment, dust suppression measures and estimated mitigation efficiencies were incorporated into the dust emission calculations. A 50 percent reduction of the dust generated from wind erosion and general construction activities may be achieved with twice daily watering of the active site area with complete coverage as suggested by AP-42. If necessary, the watering frequency may be increased to once every 1.5 hours such that the dust reduction efficiency would be increased to 75%.

3.5.7 References for the calculations of dust emission factors from different dust generating activities are tabulated in **Table 3.4** below. Details of the emission factors calculations are listed in **Table B1.1** in **Appendix B** of this report.

**Table 3.4 References on Dust Emission Factors from Different Activities**

| Activity | References (AP-42, 5th Edition) |
|---|---|
| General construction activities | Section 13.2.3 |
| Wind erosion of open site | Table 11.9-4 |

*Assessment Methodology - Dispersion modelling*

3.5.8 Dispersion modelling was undertaken using USEPA approved Fugitive Dust Model (FDM) to assess potential dust impacts arising from construction activities. Wind data recorded at the closest weather station, Ching Pak House (Tsing Yi) station, operated by the Hong Kong Observatory were combined with surface observations from the Hong Kong Observatory Headquarters to produce the best available data set for the analysis. Surface roughness was taken as 1 metre in the FDM model to represent the rolling terrain in the vicinity of the study area. The background TSP concentration was taken as 90 $\mu gm^{-3}$ based on the annual average TSP concentration for year 1996 recorded at Tsuen Wan air quality monitoring station operated by EPD.

3.5.9 For the purpose of this assessment, it is considered that dust emissions from vehicles moving on unpaved road surfaces would constitute the major dust source for most of the construction sites. Since no site specific information was available relating to particle size distribution, and the unpaved road emission equation from AP-42 5th Edition is applicable for different geographical conditions, the particle size distribution used in the FDM model was estimated based on the particle size multipliers for the unpaved road emission equation. With particle size classes of 0-2.5 μm, 2.5-5 μm, 5-10 μm, 10-15 μm and 15-30 μm, the percentage in each class was estimated to be 9.5%, 10.5%, 16%, 14% and 50% respectively.

3.5.10 Modelling was undertaken to establish Total Suspended Particulate (TSP) concentrations at the representative ASRs (A1-A11 and A43-A47) for 1-hour and 24-hour average time periods. It was assumed that actual construction work would take place during day-time from 8 a.m. to 6 p.m. The wind erosion of open sites would take place over the whole day. Hourly variations of each dust emission activity were incorporated in the model. A schematic diagram showing the construction areas of the project and the representative ASRs is illustrated in **Figure B1.1** in **Appendix B**. Sample input and output files of the FDM model are also included in **Appendix B**.

## 3.6 Air Quality (Operational Phase)

3.6.1 During the operational phase of the project, traffic emissions from the new road network and the existing roads will potentially affect the air sensitive receivers in the area. Besides, assessment was also undertaken to determine the potential plume impingement from stack emissions in Tsuen Wan and Kwai Chung areas on the development area in Tsuen Wan Bay.

*Assessment Criteria*

3.6.2 The Air Pollution Control Ordinance (APCO) provides powers for controlling air pollutants from a variety of stationary and mobile sources. It encompasses a number of Air Quality Objectives (AQO) which stipulate concentrations for a range of pollutants. Those that are relevant to the operational phase assessment are listed in **Table 3.5** below.

**Table 3.5 Hong Kong Air Quality Objectives**

| Pollutant | Concentration[1] ($\mu g/m^3$) | |
|---|---|---|
| | 1 hour[2] | 24 hours[3] |
| Carbon Monoxide (CO) | 30,000 | --- |
| Respirable Suspended Particulates (RSP) | --- | 180 |
| Nitrogen Dioxide ($NO_2$) | 300 | 150 |
| Sulphur Dioxide ($SO_2$) | 800 | 350 |

Notes:
1 Concentrations measured at 298°K (25°C) and 101.325 kPa.
2 One-hour criteria not to be exceeded more than three times per year.
3 24-hour criteria not to be exceeded more than once per year.

*Assessment Methodology - Traffic Emissions Calculations*

3.6.3 The forecasted year 2011 AM peak hour traffic flow and vehicle mix provided by the traffic consultant were used in the assessment. Emission factors for CO, $NO_X$ and RSP were taken from the *Fleet Average Emission Factors - EURO2 Model* provided by EPD for year 2011. The composition was broken down into three categories namely public transport, goods vehicles and passenger cars. In this assessment, emission factors for public buses and private cars (petrol cars for $NO_X$ and CO calculations, diesel cars for RSP calculation) were taken for public transport category and passenger cars category respectively. Based on the *Annual Traffic Census 1994 of Hong Kong*, Transport Department, in AM peak hour, the goods vehicles are composed of about 40% light goods vehicles (LGVs) and 60% heavy goods vehicles (HGVs) at the north end of Tsuen Wan and Shatin, and at the east end of Tuen Mun and Yuen Long. Therefore, in this assessment, the emission factors for the goods vehicles category were estimated based on a conservative composition of 30% LGVs and 70% HGVs. The composite emission factors are summarised in **Table B2.1** of **Appendix B**. No speed correction or other adjustments were made. 20% of $NO_X$ was assumed to be $NO_2$, as normally adopted for such assessments.

3.6.4 Petrol vehicles contribute more CO, while diesel-powered heavy vehicles emit more nitrogen oxides and particulates. Current emission controls would reduce emissions from petrol vehicles as more vehicles will be fitted with catalytic convertors. In view of the lower composite emission rates of RSP and the high statutory limit of CO, the key air quality issue is $NO_2$. If $NO_2$ levels comply with the AQO, it is likely that both RSP and CO would also comply with their respective AQO. The majority of air quality studies undertaken in Hong Kong, and the monitoring as undertaken by EPD, indicate this to be the case. This assessment therefore focused on predicting future $NO_2$ concentrations arising from the road network.

3.6.5 The emissions from the portals of the tunnel connecting Hoi On Road and Tsuen Wan Road are also modelled in this assessment in accordance with the *1991 Permanent International Association of Road Congress Report (1991 PIARC Report)*. The tunnel portal emission rates were calculated base on the traffic flow, the calculated emission rate for $NO_2$ (20% of $NO_X$ ) and the length of the tunnel. With no ventilation system, the emission rates for $NO_2$ at the eastern portal and the western portal were estimated to be 0.1119 $gs^{-1}$ and 0.0451 $gs^{-1}$ respectively. The detailed calculations are shown in **Table B2.2** of **Appendix B**. In this assessment, it was assumed that a tunnel ventilation system will be provided to minimize the air quality impacts in the vicinity of the tunnel portals. The proposed location of the ventilation shaft was shown in **Figure 6.3**. It was assumed that the ventilation system can discharge up to 70% of the traffic emissions in the tunnel vertically into the atmosphere through the ventilation shaft discharged at a height of 15 m above ground at 10 $ms^{-1}$. The remaining 30% of the traffic emissions would be discharged from the tunnel portals.

*Assessment Methodology (Traffic Emission - Dispersion modelling)*

3.6.6 The dispersion of $NO_2$ was modelled using USEPA approved CALINE4 dispersion model. The mixing height was assumed to be 500 m. The surface roughness was set to be 100 cm and the wind direction standard deviation was taken as 12 degrees. Bridge option was employed in the CALINE4 model to simulate the effect of elevated roads. For the road section with noise barrier, the height of the road section was raised to the level of the barrier to simulate the barrier effect. A threshold height limit of 10 m was set for elevated road sections higher than 10 m, owing to the limitation of the CALINE4 model.

3.6.7 The dispersion of $NO_X$ was modelled using the USEPA approved CALINE4 dispersion model. Multiple runs of the CALINE4 model using 360 meteorological conditions (a combination of 36 categories of wind direction, 5 categories of wind speed and 2 categories of stability class) were carried out to find the worst-case meteorological condition. The background $NO_2$ concentration was taken as 60 $\mu gm^{-3}$ (based on the annual average $NO_2$ concentration in Tsuen Wan measured by the EPD's air monitoring station in the year 1996). The modelling parameters are summarised below:

- Wind direction: 36 categories (0 to 350 degrees in 10 degrees interval)
- Wind speed: 5 categories (1, 2, 4, 6 and 8 $ms^{-1}$)
- Stability class: 2 categories (B and D)
- Mixing height: 500 m
- Surface roughness: 100 cm
- Wind direction SD: 12 degrees
- Background $NO_2$: 60 $\mu gm^{-3}$

3.6.8 $NO_2$ emissions from the portals were predicted assuming the emissions behave as volume sources in accordance with the recommendations in the *1991 Permanent International Association of Road Congress Report (1991 PIARC Report)*. Dispersion of portal emissions and emission from the exhaust stack of the tunnel ventilation system were simulated using ISCST model. The $NO_2$ concentrations predicted by both the CALINE4 and the ISCST models at each receptor point were then summed to produce the cumulative concentrations. Modelling was undertaken to predict the worst case 1-hour average $NO_2$ concentrations of the selected ASRs at receiver heights of 1.5 m above ground and the first floor level.

3.6.9 Details of the dispersion modelling, including simulated road links and the corresponding emission rates are tabulated in **Table B2.1** in **Appendix B**. The location plan of the representative ASRs and the modelled road links is shown in the **Figure B2.2** in **Appendix B**. Sample input and output files of the CALINE4 and ISCST models are also included in **Appendix B2**.

*Assessment Methodology (Stack Emissions - Emissions calculations)*

3.6.10 In this assessment, EPD has provided the detailed information of the stack locations, heights, diameters, fuel consumption and the hours of operation. Modelling was undertaken for the stack emissions within a 1.5 kilometres radius.

3.6.11 Gas exit velocity and temperature of the stacks were not always available. For this assessment, the emission rates of sulphur dioxide were calculated in accordance with USEPA *Compilation of Air Pollutant Emission Factors* (AP-42). Gas exit velocity of the stacks were estimated for different heat input of the fuel using equipments with reference to *Chimney Heights - Third Edition of the 1956 Clean Air Act Memorandum (1981)*, UK Department of the Environment. For gas exit temperature, a number of gas exit temperatures within normal operating range, namely 150 °C, 200 °C and 250 °C were used for stacks with no available gas exit temperature data. Modelling was undertaken to predict the maximum impacts over the assessment area assuming different gas exit temperatures.

3.6.12 Among the pollutants exhausted from industrial stacks, $SO_2$ is the critical one for determining compliance with the AQOs. From USEPA Compilation of Air Pollutant Emission Factors (AP-42), the CO, $NO_x$ and particulates generation rates for any given fuel consumption rate for fuel of 0.5% sulphur content, which is the maximum sulphur content in liquid fuels under the Fuel Restriction Regulations implemented in July 1990, will be 7%, 28% and 3% of the $SO_2$ generation. If the AQO for $SO_2$ is achieved, the AQOs for CO, $NO_2$ and particulates would also be met.

*Assessment Methodology (Stack Emissions -Dispersion modelling)*

3.6.13 Air quality dispersion modelling was undertaken using the USEPA approved Industrial Source Complex Short Term (ISCST) model. Urban Mode 3, stack-tip downwash and gradual plume rise options were taken in the model. Prediction of the maximum 1-hour average, maximum 24-hour average and annual average $SO_2$ concentrations in the Development Area are based on the real meteorological data, including wind speed and wind direction and temperature, from Ching Pak House (Tsing Yi) station for year 1993. In addition, the meteorological data were combined with surface observations recorded at the Hong Kong Observatory Headquarters to derive the best available data set. Hourly emission scaling factors were applied to all sources based on the operation hours per day. Modelling was undertaken to predict the maximum 1-hour average, maximum 24-hour average and annual average $SO_2$ concentrations at the selected ASRs at receiver height from the first to the thirty-seventh floor level. Sample input and output files are included in **Appendix B3**.

3.6.14 In the 1.5 kilometres calculation radius, the emissions from 76 stacks were modelled. The nearest stacks are located at Kong Nam Industrial Building to the north of the site and the industrial buildings along Chai Wan Kok Street to the north-east of the site. A schematic location plan of the stacks is shown in **Figure B3.1** of **Appendix B3**. Since the model had covered a considerably large area, it was assumed that the predicted concentrations would include most if not all of the background concentration in the area.

## 3.7 Water Quality Assessment

*Construction Phase*

3.7.1 The 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 3.6 and 3.7**. 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 3.8 and 3.9**.

3.7.2 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.

3.7.3 Dredging and other construction phase activities are recognised as potentially polluting uses. The main concern is pollution caused by silt, oil and floating refuse while work is in progress. The HKPSG states that care should be taken in planning and implementing the works to avoid, minimise or ameliorate the occurrence of these adverse effects on water bodies, particularly in areas already suffering some degree of pollution, where there is a risk that any additional environmental stress will result in adverse ecological changes, and in areas used for contact recreation, such as bathing beaches.

3.7.4 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 3.10**.

3.7.5 A practice note (PN) for professional persons was issued by the EPD to provide environmental guidelines for handling and disposal of construction site discharges. The ProPECC PN 1/94 "Construction Site Drainage" provides a good practice guide for dealing with ten types of discharge from a construction site, namely: surface run-off; groundwater; boring and drilling water; wastewater from concrete batching and precast concrete plant; wheel washing water; bentonite slurry; water for testing and sterilization of water retaining structures and water pipes; wastewater from building constructions; acid cleaning, etching and pickling wastewater; and wastewater from site facilities. Practices given in the PN should be followed as far as possible during construction to minimize the water quality impact due to construction site drainage.

*Operational Phase*

3.7.6 The Water Quality Objectives stated above apply also to operational phase impacts, when long-term effects on drainage, siltation and pollution are of concern.

## Table 3.6 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 3.7 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<br>not less than 4 mg/L | marine waters<br>Inland waters |
| pH value | within the range 6.5 to 8.5; change due to waste discharge not to exceed 0.2<br>within the range of 6.0 - 9.0 | marine waters<br>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<br>annual median not to exceed 25 mg/L | marine waters<br>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<br>not to cause a risk to any beneficial use of the aquatic environment | whole zone<br>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<br>annual mean depth average inorganic nitrogen not to exceed 0.4 mg/L | marine waters<br>marine waters |

**Table 3.8 Standards for Effluents Discharged Into Inshore Waters of Western Buffer 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 | 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 3.9 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 3.10 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 |

## 3.8 Solid Waste and Mud Contamination

3.8.1 Calculation of waste generated from the future development was based on the population figures presented in the Draft Investigation Final Report for the current study. Generation rate for different types of waste followed the data provided in the Government's Publication: *Monitoring of Solid Waste in Hong Kong 1995*. The details of the calculation can be found in **Chapter 8** of this report.

3.8.2 The principal legislative framework for waste collection and disposal is the Waste Disposal Ordinance (Cap 354) which provides a licensing system for the collection and disposal of wastes. Under the terms of the Waste Disposal Ordinance construction waste is classified as trade waste and as such the Contractor will be responsible for their disposal. Regulations for chemical waste control are provided under a regulation of this Ordinance [Chemical Waste (General) Regulation 1992] and administer the possession, storage, collection, transport and disposal of chemical wastes.

3.8.3 The procedures to be adopted in the dredging and disposal of marine sediments are detailed in Works Branch Technical Circular No. 22/92, Marine Disposal of Dredged Mud. The Circular outlines the steps that must be followed when applying for licensed disposal of dredged marine materials at sea. The criteria for the classification of sediments on the basis of their contamination status are described in the EPD Technical Circular (TC) No 1-1-92, Classification of Dredged Sediments for Marine Disposal.

**Table 3.11 Classification of Sediments by Metal Content (mg/kg dry weight) in Hong Kong**

| | Cd | Cr | Cu | Hg | Ni | Pb | Zn |
|---|---|---|---|---|---|---|---|
| Class A | < 0.9 | < 49 | < 54 | < 0.7 | < 34 | < 64 | < 140 |
| Class B | 1-1.4 | 50-79 | 55-64 | 0.8-0.9 | 35-39 | 65-74 | 150-190 |
| Class C | 1.5 or more | 80 or more | 65 or more | 1 or more | 40 or more | 75 or more | 200 or more |
| Source : EPD Technical Circular 1-1-92 | | | | | | | |

3.8.4 Three classes of contamination are categorised in accordance with the table given in EPD TC 1-1-92 (**Table 3.11** above) and the classes are defined as follows :

**Class A** Uncontaminated or mildly contaminated material for which no special dredging, transport or disposal methods are required except those which would normally be applied for the purpose of ensuring compliance with EPD's Water Quality Objectives, or for protection of sensitive receptors near the dredging or disposal areas.

**Class B** Moderately contaminated material which requires special care during dredging and transport, and which must be disposed of in a manner which ensures effective isolation and minimum loss of pollutants either by loss into solution or by resuspension.

**Class C** Highly contaminated material which must be dredged and transported with great care and which must be permanently isolated from the environment, and which should not be dumped in the Gazetted marine disposal grounds. Environmentally acceptable disposal methods and areas will be advised by EPD on a case by case basis.

3.8.5 The current policy relating to the dumping of solid waste is documented in the Works Branch Technical Circular No. 2/93, `Public Dumps'. In order to dispose of waste in a public dump, a license is required which is issued by the Civil Engineering Department (CED). The Works Branch Circular states that construction waste suitable for dumping should not be disposed of to landfill, but placed in public dumps on reclamation and land formation projects. The Public Dumping Sub-Committee (PDSC) together with Project Departments are responsible for considering the suitability of a site as a public dump.

3.8.6 In addition to the Works Branch Circular, EPD and CED have produced a leaflet titled `New Disposal Arrangements for Construction Waste' which states that construction waste with less than 20% by volume of inert material will be accepted at landfill. If the material contains more than 20% inert material, the waste must be sorted with suitable material sent to public dump and non-inert waste sent to landfill for final disposal.

*Mud Contamination Assessment Methodology*

3.8.7 The assessment included sampling and testing of mud from the seabed at ten locations in order to quantify the extent of contamination within the proposed reclamation area. The locations of vibrocores are shown in **Figure 8.2**.

3.8.8 The field sampling work was carried out during August to October 1995. Vibrocores were recovered by pushing 6 m long vibrocore tubes into the seabed. Sediment samples were recovered from the vibrocore at depths stipulated in the Works Branch Technical Circular no. 22/92 for the purpose of contamination analysis.

3.8.9 Sediments recovered from vibrocores were laboratory tested for the following parameters:

- Heavy metals concentrations including chromium(Cr), copper(Cu), mercury(Hg), lead(Pb), cadmium(Cd), nickel(Ni) and zinc(Zn) on all the sediment samples recovered;
- Total polychlorinated biphenyls (PCBs) for composite sediment samples; and
- Polyaromatic hydrocarbons (PAHs) for composite sediment samples.

## 3.9 Risks and Hazards

*Overview*

3.9.1 For developments of, or close to, designated Potentially Hazardous Installations (PHIs), consideration must be given to the Risk Guidelines as endorsed by the Co-ordinating Committee on Potentially Hazardous Installations (CCPHI). The requirements of the Risk Guidelines are detailed in **Chapter 11**, HKPSG and involve compliance with the Individual Risk Guideline (IRG) and Societal Risk Guidelines (SRG).

3.9.2 It is important to note that all (significant) proposals for developments within a PHI Consultation Zone must be subjected to a risk assessment. The findings of the assessment must then be endorsed by the CCPHI before such developments may proceed.

*Individual Risk Guideline (IRG)*

3.9.3 The IRG requires that no individual beyond the site boundaries of a PHI should be put at a risk of greater than $1 \times 10^{-5}$ per year. In other words, the risk to any particular individual of being fatally injured as a result of an accident at a nearby PHI must be less than 1 chance in 100,000 per year.

3.9.4 It is standard Hong Kong practice to present the individual risk results in the form of risk contours to represent the theoretical maximum risk at any point. In determining compliance with the IRG, it is important to consider the "actual" level of individual risk which will be lower due to such factors as occupancy, taking evasive action, etc.

*Societal Risk Guidelines (SRG)*

3.9.5 Societal risk represents the overall risk to the population surrounding a PHI. It is calculated as follows:

- determine the numbers of fatalities ($N_i$) for each and every possible outcome;
- determine the likelihood, $f_i$, of each and every possible outcome;
- sum the values of $f_i$ over events which could lead to N or more fatalities; and
- present the results in the form of "fN" (societal risk) curves.

3.9.6 **Figure 3.1** provides an example of an "fN" curve associated with the SRG. As can be seen, the SRG comprises three zones:

- one in which the risks are deemed to be unacceptable;
- one in which the risks are deemed to be acceptable; and
- one in between in which the risks should be reduced "as low as reasonably practicable" (known as the ALARP principle).

3.9.7 Societal risks are expressed as the likelihood (f) of N or more fatalities. By way of example, if it was calculated that the likelihood of 100 or more fatalities was $1 \times 10^{-4}$ per year (i.e. 1 chance in 10,000 per year), the risks would be deemed to be "unacceptable". As would be expected, the lower the risk (in terms of 'f' and/or 'N'), the more acceptable the risks. In some cases, the risks are neither so high as to be deemed unacceptable nor so low as to be deemed acceptable. In such cases, the risks appear within the 'ALARP region' which requires that the risks are reduced "ALARP".

*Application to New Developments*

3.9.8 The application of the SRG to new developments in the vicinity of a PHI has been discussed with EPD[1]. The current procedures may be summarised as follows:

- review a recent Hazard Assessment of the PHI itself;
- determine whether the listing of incidents, their frequencies and associated release sizes (or rates) is still applicable (and modify if appropriate);
- use this input data to predict the risks for the new development using appropriate consequence and risk quantification models;

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1 Meeting of RPA/CES and EPD held on 18 July 1995 to discuss chlorine hazard assessments and their implications.

- determine whether the risk levels (in both individual and societal terms) are "acceptable" as prescribed by the Risk Guidelines; and

- if not, consider cost-effective risk mitigation measures.

3.9.9 An important point to emerge is that for Government developments (such as the Tsuen Wan Bay reclamation) close to Government facilities (such as the YKT works), then it may be possible to consider the application of risk mitigation measures to the development area and/or the PHI.

3.9.10 In broad terms, for large scale developments in the vicinity of PHIs, should the assessed risks not appear to be 'acceptable' within the context of both the Individual and Societal Risk Guidelines, it is unlikely that the development will be permitted to proceed.

3.9.11 In summary, it will be necessary to demonstrate that the risks to users of the reclaimed area (including reclamation and construction workers) will be "acceptable" taking account of any cost-effective risk reduction measures.

*Approach of the Assessment*

3.9.12 The approach to the study has been reported in the following reports:

- Inception Report;

- Environmental Initial Assessment Report (EIAR); and

- Environmental Key Issue Report (EKIR).

3.9.13 The general approach to the hazard assessment was specified in the Inception Report as follows:

- a general review of the development area and associated plans;

- discussions with interested parties to ensure that all risk concerns are highlighted at an early stage of the project;

- a review of the on-going Hazard Assessment of the Yau Kom Tau WTW to assess the likely degree of risk to the study area;

- a review of the Tsuen Wan DG Anchorage study commissioned by Marine Department to identify any key risk issues;

- to report on this initial review work in the Initial Assessment Report;

- more detailed analysis on those risk issues which could affect people within the study area including preparation of risk contours, etc. and identification of any cost-effective risk mitigation measures;

- to report on the detailed analysis in a Key Issue Report; and

- a Hazard Assessment Report at the end of the Study.

This approach has been followed throughout the risk assessment study.

3.9.14 For the EKIR, the Consultants undertook a preliminary analysis of three development options (High Population and Low Employment; Mid-range Population and Employment, and Low Population and High Employment). This preliminary analysis indicated that the level of risk within the development area would be very low and would be very unlikely to place significant constraints upon the development.

3.9.15 The risk assessment is presented in **Chapter 9** of this Report presents the results of the analysis required by Section 4.8.1 of the Brief.

*Master Development Plan*

3.9.16 The MDP provides a basis on which to undertake a more detailed analysis of the risks to the proposed development associated with the YKT works. Risk assessment is based on the MDP presented in the Draft Investigation Final Report for the current study. The study area extends over a range of about 500 m to about 1500 m from the YKT works. Within this, the MDP comprises a number of planning areas as summarised in **Table 3.12**. The details of the MDP can be found in **Chapter 2** of this report.

*Population at Risk*

3.9.17 In order to assess the risks (and the societal risks in particular), it is necessary to translate the information presented in **Table 3.12** into the 'population at risk'. This process relies on a number of assumptions as set out in **Table 3.13**. As will be seen, this includes a 'background population' to account for road users, pedestrians and users of the local amenities (park, seafront area, etc.).

3.9.18 Since the vertical dispersion of chlorine releases is limited, only those on the lowest floors would be at risk in the event of a release. To account for this, the 'population at risk' in high rise blocks will be taken as 15% of those present (which corresponds, approximately, to the lowest five floors being at risk). In all other cases, 100% of those present will be considered to be at risk.

3.9.19 Taking these factors into account, it was then possible to derive the population distributions presented in **Table 3.14**. As can be seen from **Table 3.14**, there will be over 9,000 people 'at risk' within the area of interest by day and nearly 5,000 by night. In each case, about 45% will be within the CZ of the YKT works.

### Table 3.12 Planning Areas Proposed in MDP

| Area | Within Consultation Zone (CZ)? | Nature of Development | Blocks | Storeys (max) | Residential Population | Worker Population |
|---|---|---|---|---|---|---|
| 101A | Yes | Rental (PSPS) | 6 | 34/41 | 5200 | 133 |
| 101B | Yes | School | | 6 | | 50* |
| 101C | Yes | Open space/Park | | | 0 | 0 |
| 102A | Partly | Rental (PSPS) | 6 | 41 | 5800 | 149 |
| 102B | Partly | Open space | | | 0 | 0 |
| 103A | Partly | Private Housing (R1) | 10 | 34/41 | 7500 | 110 |
| 103B | Yes | School | | 6 | | 50* |
| 103C | No | School | | 6 | | 50* |
| 104A | No | Public Rental | 5 | 41 | 11232 | 265 |
| 104B | No | School | | 6 | | 50* |
| 105 | No | Commercial/Hotel | | 41 | | 7268 |
| | | | | Totals | 29732 | 8125 |

Note : the number 50 refers to the number of workers in school (ie. teachers etc). The number of students was assumed to be 14% of the residential population (see Table 3.13).

### Table 3.13 Assumptions to Derive Population at Risk

| Nature of Development | by day (0700-1900) | by night (1900-0700) |
|---|---|---|
| Residential | 40% at home<br>14% at school<br>46% away at work | 100% at home |
| Commercial | 100% at work | 10% at work |
| Background * | 50 /ha | 20 /ha |

Note : The background figures represent the average number of people not otherwise accounted for. These include road users and users of open space such as park, seafront area etc. It is accepted that, on occasion, there will be greater numbers but equally, on other occasion, there will be fewer.

*The YKT Works*

3.9.20 The YKT works has been the subject of a recent and detailed analysis as part of the Castle Peak Road Improvement Study[2]. Rather than replicate the analysis of the hazards and risks associated with the YKT works, the referenced document (hereafter referred to as the Castle Peak Road Report) provides a useful basis on which to examine the

2 Maunsell Consultants Asia Ltd (1995): **Feasibility Study for Castle Peak Road Improvements - Hazard Assessment**, Final Report V4 prepared for Highways Department under contract CE39/94 and dated December 1996.

risks to the Tsuen Wan Bay study area.

3.9.21 The operational parameters used in the Castle Peak Road Report are summarised in **Table 3.15**. It should be noted that this takes account of the recently commissioned expansion of the YKT works and allows for some further deterioration in the raw water quality from China (which leads to a greater chlorine demand).

3.9.22 The Castle Peak Road Report examined, in some detail, the range of potential accidents ranging from minor releases of gaseous chlorine within the chlorine store to the instantaneous release of several tonnes of chlorine (liquefied under pressure) directly into the atmosphere. The hazard identification, hazard analysis and consequence analysis for the YKT WTW can be found in the Castle Peak Road Report.

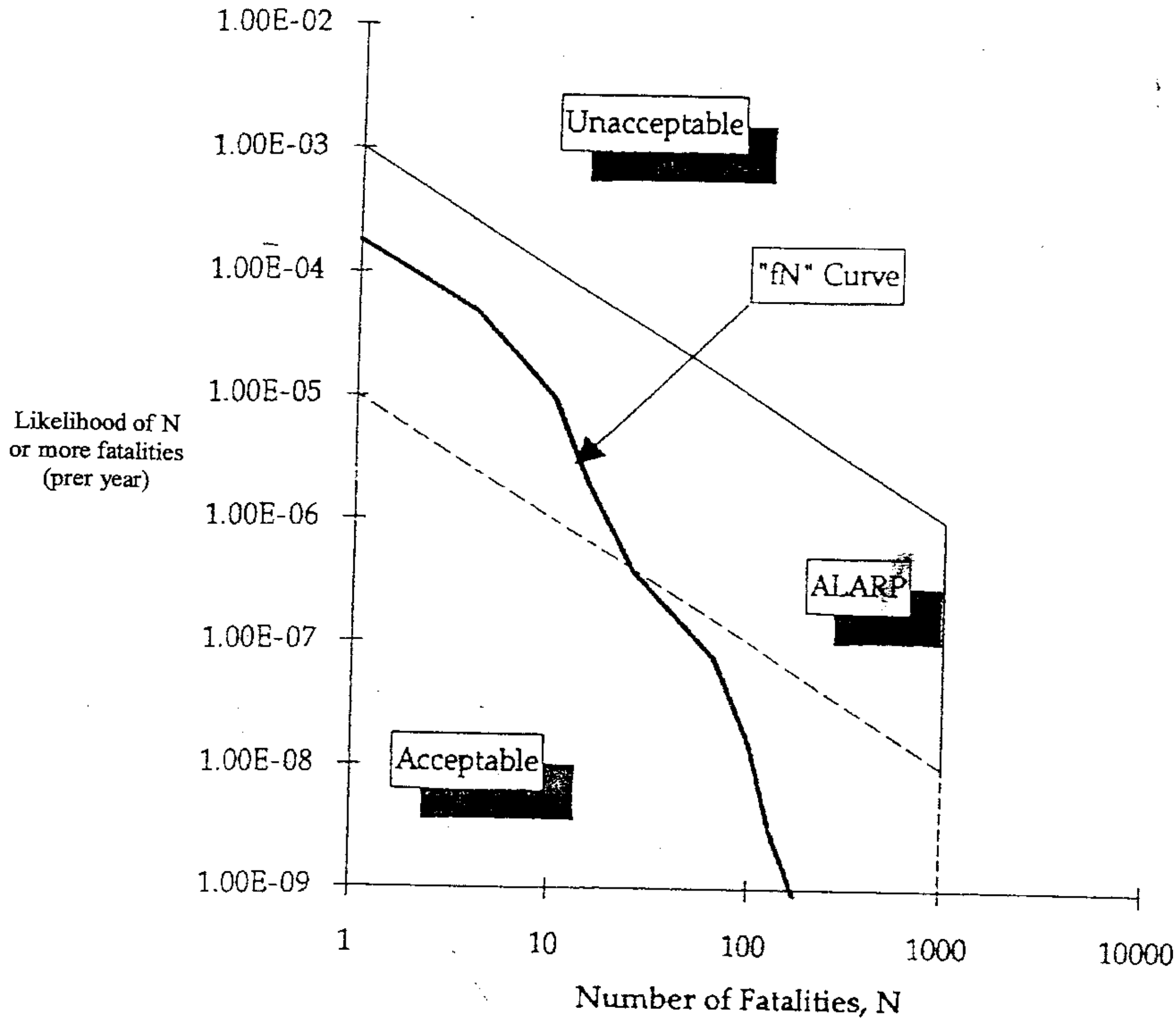
3.9.23 For the purposes of this study, it has been assumed that the associated analysis of the range of potential accidents is sufficiently robust that reliance can be placed upon the results.

**Table 3.14 'Populations at Risk' (By Day and Night)**

| Distance from Chlorine Store, YKT works (m) | Population at Risk | |
|---|---|---|
| | by day | by night |
| 500-600 m | 50 | 10 |
| 600-700 m | 110 | 22 |
| 700-800 m | 1442 | 766 |
| 800-900 m | 907 | 441 |
| 900-1000 m | 1538 | 1021 |
| 1000-1100 m | 1659 | 705 |
| 1100-1250 m | 2241 | 1733 |
| 1250-1400 m | 752 | 172 |
| >1400 m | 610 | 68 |
| All | 9309 | 4938 |

**Table 3.15 Operational Parameters for YKT WTW Used in the Castle Peak Road Report**

| Parameter | Value |
|---|---|
| Chlorine throughput (in 1t drums) | 520 tonnes per year |
| Storage capacity | 62 drums |
| Maximum permitted storage | 45 drums |
| Chlorine drum deliveries | 95 per year |
| Duty drums (i.e. drums discharging chlorine) | 2 with 2 on stand-by |
| Evaporators | 3 (1 on stand-by) |
| Chlorinators | 6 (2 on stand-by) |
| Full contain and absorb system? | Yes |




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

SOCIETAL RISK GUIDELINES WITH 'fN' CURVE

| | |
|---|---|
| FIGURE | 3.1 |
| SCALE | NOT TO SCALE |

# 4 ENVIRONMENTAL BASELINE CONDITION

## 4.1 Site Description

4.1.1 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.

4.1.2 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.

4.1.3 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. The China Resources Company oil terminal is also located at a similar distance away on north Tsing Yi. This terminal gives rise to dangerous goods movements in the Rambler Channel, but is being relocated and will no longer do so by the time the reclamation is complete.

4.1.4 Yau Kom Tau WTW is around 400 m from the nearest point of the proposed reclamation.

## 4.2 Existing Sensitive Receivers

4.2.1 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 4.1** (Air and Noise) and **Figure 4.2** (Water), and are summarised in **Table 4.1**. In addition to the receivers shown, land uses on the TWB reclamation will result in future sensitive receivers.

*Noise Sensitive Receivers*

4.2.2 The dominant traffic noise sources in the area are currently road traffic along Road 2/1 (Hoi On Road), Hoi Hing Road and the elevated Tsuen Wan Road. Existing residential buildings in Bayview Garden, Belvedere Garden, Clague Garden Estate, and Hing Shing temporary housing accommodation are all affected by these major roads, and are considered noise sensitive receivers under the NCO and HKPSG. However, Hing Shing temporary housing accommodation will be demolished and thus will not be considered further in this study. The locations of representative facades in these existing residential areas exposed to traffic noise are shown and numbered in **Figures 4.3, 4.4 and 4.5**.

**Table 4.1 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 |

*Air Quality Sensitive Receivers*

4.2.3 Representative air sensitive receivers (ASR) were identified for the air quality assessment as listed in **Table 4.2** below. ASR A1-A11 and ASR A43-A47 are existing air sensitive receivers selected for the construction and the operational phase impact assessments. While ASR A12-A42 are future air sensitive receivers selected for the operational phase impact assessment. The locations of air sensitive receivers (ASRs) are shown in **Figure 4.6**.

**Table 4.2 Locations of Representative Air Sensitive Receivers**

| ASR | Location Description | Existing / Future |
|---|---|---|
| A1-A5 | Residential building block in Bayview Garden | Existing |
| A6-A11 | Residential building block in Belvedere Garden | Existing |
| A12-A17 | Residential building block in Area 101A | Future |
| A18-A23 | Residential building block in Area 102A | Future |
| A24-A33 | Residential building block in Area 103A | Future |
| A34-A38 | Residential building block in Area 104A | Future |
| A39 | School in Area 101B | Future |
| A40 | School in Area 103B | Future |
| A41 | School in Area 103C | Future |
| A42 | School in Area 104B | Future |
| A43 | Southeast Industrial Building | Existing |
| A44 | Kong Nam Industrial Building | Existing |
| A45 | Lok Shun Factory Building | Existing |
| A46 | Golden Bear Industrial Centre | Existing |
| A47 | Residential building block in Clague Garden | Existing |

## 4.3 Background Noise Levels

4.3.1 Traffic flow monitoring was undertaken by the traffic consultants in 1994 to establish existing baseline conditions. Accordingly, noise assessment has been performed using the surveyed traffic flows and designed speeds (70 km/h for Tsuen Wan Road and 50 km/h for other roads) to predict the 'existing' traffic noise levels at selected residential facades. The results are provided in **Appendix A2**. For representative facades in Bayview Garden and Belvedere Garden that are affected by Hoi On Road, the predicted 1994 noise levels are under 70 dB(A) except at ground floors of selected NSRs overlooking Hoi On Road. On the other hand, the predicted 1994 noise levels at representative facades in Clague Garden Estate range from 67 to 78 dB(A) depending on the proximity to the existing Tsuen Wan Road.

4.3.2 Noise monitoring also indicates fixed source noise levels of up to 75 dB(A) ($L_{eq\,(30\,min)}$) at 20 m from the industrial buildings, with the dominant noise sources being the air-cooled condensing units and ventilation exhausts of the industrial buildings. The statutory industrial noise limit is 70 dB(A) for daytime and evening periods, assuming an Area Sensitivity Rating of 'C'. For night-time noise the statutory limit falls to 60 dB(A).

4.3.3 The area occupied by Belvedere Gardens and the industrial buildings has been up-zoned to a Comprehensive Development Area (CDA), hence the industrial buildings may eventually be replaced by commercial/residential development. This would have positive benefits for the noise environment in this area. In terms of traffic noise, heavier traffic flows along Road 2/1, as a result of the widening of Castle Peak Road, are expected to cause an increase in the noise impacts from Road 2/1.

## 4.4 Baseline Air Quality

4.4.1 Air quality monitoring in the Tsuen Wan area has been closely monitored by Environmental Protection Department (EPD). Pollutants such as sulphur dioxide ($SO_2$), nitrogen dioxide ($NO_2$), total suspended particulates (TSP) and respirable suspended particulates (RSP) have been measured.

4.4.2 The arithmetic means of the hourly average $SO_2$ concentrations recorded at Tsuen Wan range from 28 to 50 $\mu gm^{-3}$ for years 1989 to 1994. These are about 35 to 63% of the annual average AQO for $SO_2$.

4.4.3 The arithmetic means of the hourly average $NO_2$ concentrations recorded at Tsuen Wan range from 52 to 67 $\mu gm^{-3}$ for years 1989 to 1994. These are about 65 to 84% of the annual average AQO for $NO_2$.

4.4.4 The arithmetic means of the 24-hour average TSP concentrations recorded at Tsuen Wan range from 87 to 107 $\mu gm^{-3}$ for years 1989 to 1994. These exceeded the annual average AQO for TSP of 80 $\mu gm^{-3}$. For RSP, the arithmetic means of the 24-hour average concentrations range from 48 to 64 $\mu gm^{-3}$ for years 1989 to 1994. Exceedances of the annual average AQO for RSP of 55 $\mu gm^{-3}$ were recorded for some years.

4.4.5 The major sources of air pollutants in the area are emissions from industrial stacks and road traffic. Their locations are shown in **Figure 4.7**. Significant impacts on the site are coming from the large number of industrial stacks located to the north and north-east of the site as well as the high volume of traffic on Castle Peak Road, Kwai Chung Road and Tuen Mun Road.

4.4.6 Site inspection determined that there were some potential fugitive emissions from Kong Nam Industrial Building located to the north of the site. Potential fugitive emissions were coming from exhaust openings on lower levels of the southern facade of the building. The exhaust openings were all fitted with hoods diverting the emissions downward. Findings of the visual inspection indicated that there was no major air quality impact from fugitive emissions of Kong Nam Industrial Building. Besides, the separate distance between Kong Nam Industrial Building and the site boundary is more than 100 metres. It is expected that fugitive emissions from the building would be well dispersed and diluted before they reach the proposed development.

4.4.7 Currently, the major sources of stack emissions and fugitive emissions in the proximity of the proposed development are industrial buildings located to the north of the site next to the Belvedere Gardens. The sites of those industrial buildings have been re-zoned in the Outline Zoning Plan for non-industrial uses. Those industrial buildings would be replaced by commercial/residential development and the polluting sources would also be removed.

## 4.5 Background Water Quality and Emission Source Inventory

4.5.1 Marine water quality and beach water quality in the area has been monitored by EPD. Pollutants such as 5-day biochemical oxygen demand ($BOD_5$), turbidity, suspended solids (SS) and total inorganic nitrogen (TIN) have been measured.

4.5.2 EPD marine water quality monitoring station VM14 lies just to the south of the site in the middle of the Rambler Channel. According the EPD's Publication *Marine Water Quality in Hong Kong for 1995*, full compliance with the DO WQO at station VM14 was obtained in 1995. However, the annual mean of depth-averaged TIN recorded in VM14 (0.46 mg $L^{-1}$) did not comply with the specified WQO. Selected depth averaged water quality data for this station from 8/1/92 to 19/5/95 are plotted on **Figure 4.8** and are summarised in **Table 4.3**.

**Table 4.3 Summary of Water Quality at EPD's Monitoring Station VM14 (Data from 8/1/92 to 19/5/95)**

| Parameter | $BOD_5$ (mg $l^{-1}$) | DO (mg $l^{-1}$) | Turbidity (mg $l^{-1}$) | SS (mg $l^{-1}$) |
|---|---|---|---|---|
| Maximum | 2.46 | 7.24 | 14.3 | 37.7 |
| Minimum | 0.45 | 3.21 | 2.4 | 2.7 |
| Mean | 1.21 | 4.72 | 6.9 | 9.7 |

4.5.3 The water quality at the seven gazetted beaches in the area for the 1995 bathing season was generally poor, characterised by high *E.coli* concentrations, as presented in **Table 4.4**.

**Table 4.4 Summary of EPD Beach Water Quality within Tsuen Wan District in 1995**

| Beach Name | EPD Beach Water Quality Rank | *E.coli* Geometric Mean (count per 100 mL) |
|---|---|---|
| Approach | Very Poor | 977 |
| Ting Kau Beach | Very Poor | 1,644 |
| Lido | Poor | 444 |
| Casam | Poor | 442 |
| Hoi Mei Wan | Poor | 322 |
| Gemini Beaches | Poor | 320 |
| Angler's | Very Poor | 895 |

*Emission Source Inventory*

4.5.4 **Tables 4.4 and 4.5** provide a summary of emission source data extracted from the Sewerage Master Plan (SMP) for the area carried out in 1991. It is understood that the SMP works are on going and will be completed by the design year for the facilities on the reclamation. It is clear that stormwater flowing into the Rambler channel was contaminated by expedient connections. It is expected that this situation is currently being improved by the SMP works. Three ongoing contracts are implementing the SMP proposed works to improve the sewerage system in Tsuen Wan and Kwai Chung area. These are contract no. DC/94/01, DC/94/02 and DC/94/03. All the three contracts are scheduled to complete before end of 1997. Upon completion of the improvement works, more than 90 % of the pollution loads will be removed from the stormwater system. **Figure 4.9** reproduces a figure of pollution loads to the Rambler Channel from the SMP.

**Table 4.4 Loading from Various Sewage Outfalls**

| | Flow $m^3/s$ | | BOD tonnes/d | | TTM (total toxic metal) tonnes/d | |
|---|---|---|---|---|---|---|
| | Industrial | Total | Industrial | Total | Industrial | Total |
| SMP (1991) | | | | | | |
| Tsuen Wan | 0.3 | 0.8 | 3.9 | 13.1 | 0.3 | 0.3 |
| Kwai Chung | 0.5 | 1.3 | 12.0 | 25.3 | 1.2 | 1.2 |
| Tsing Yi | 0.01 | 0.3 | 0.1 | 5.2 | 0.01 | 0.01 |
| Total | 0.8 | 2.4 | 15.9 | 43.5 | 1.5 | 1.5 |
| After SMP & SSDS I | | | | | | |
| Total | 0 | 0 | 0 | 0 | 0 | 0 |

**Table 4.5 Loading from Various Stormwater Outfalls**

| | Flow $m^3/s$ | | BOD tonnes/d | | TTM (total toxic metal) tonnes/d | |
|---|---|---|---|---|---|---|
| | Industrial | Total | Industrial | Total | Industrial | Total |
| SMP (1991) | | | | | | |
| Tsuen Wan | 0.9 | 0.9 | 26.0 | 27.0 | 1.1 | 1.1 |
| Kwai Chung | 1.2 | 1.3 | 25.7 | 26.7 | 0.5 | 0.5 |
| Tsing Yi | 0.2 | 0.2 | 6.5 | 6.8 | 0.2 | 0.2 |
| Total | 2.3 | 2.4 | 58.2 | 60.5 | 1.8 | 1.8 |
| After SMP & SSDS I | | | | | | |
| Total | N/A | N/A | Minimal | Minimal | Minimal | Minimal |

## 4.6 Solid Waste and Mud Contamination

4.6.1 Prior to the reclamation of the proposed area it was recognised that some areas may require dredging of marine sediments. Therefore, the contamination status of such material should be determined in order that disposal/containment methods could be recommended. Due to the location of the site (inshore area with industrial activities in the vicinity), the mud is likely to be highly contaminated. Marine ground investigation carried out in late 1995. Details of the results are presented and discussed in **Chapter 8**.

4.6.2 In terms of solid waste, general construction wastes will be generated. These include general site wastes such as residues, packaging and containers, workforce wastes from site offices, works canteen and arisings from vehicles, plant equipment servicing and repair facility and arisings from accidental spillage.

## 4.7 Risks and Hazards

*General Description of the YKT Works*

4.7.1 The western half of the study area lies within the 1 km Consultation Zone (CZ) established around the YKT works. The study area, the YKT works and associated CZ are shown in **Figure 4.10**.

4.7.2 The YKT works is located about 1 km to the north west of the centre of the Study Area, on a hill-side about 80 m above sea level. Immediately to the north of the works is a covered service reservoir (with the surface at 100 m elevation). The hills then continue rising to over 470 m (Shek Lung Kung) about 1.5 km to the north-west. The works is a designated Potentially Hazardous Installation (PHI) due to the storage of nearly 50t of chlorine in 1t drums. Chlorine is a highly toxic gas which is stored as liquid under pressure.

4.7.3 Partly as a result of a comprehensive risk study[3] finalised in 1990, the YKT works was provided with a "contain and absorb" system designed to minimise off-site risks in the event of a chlorine release within the storage and handling areas. This system was commissioned in December 1993.

4.7.4 The YKT works has undergone recent further modification and expansion to increase its treated water capacity and has been the subject of another assessment[4] which has taken account of the changes since the 1990 report.

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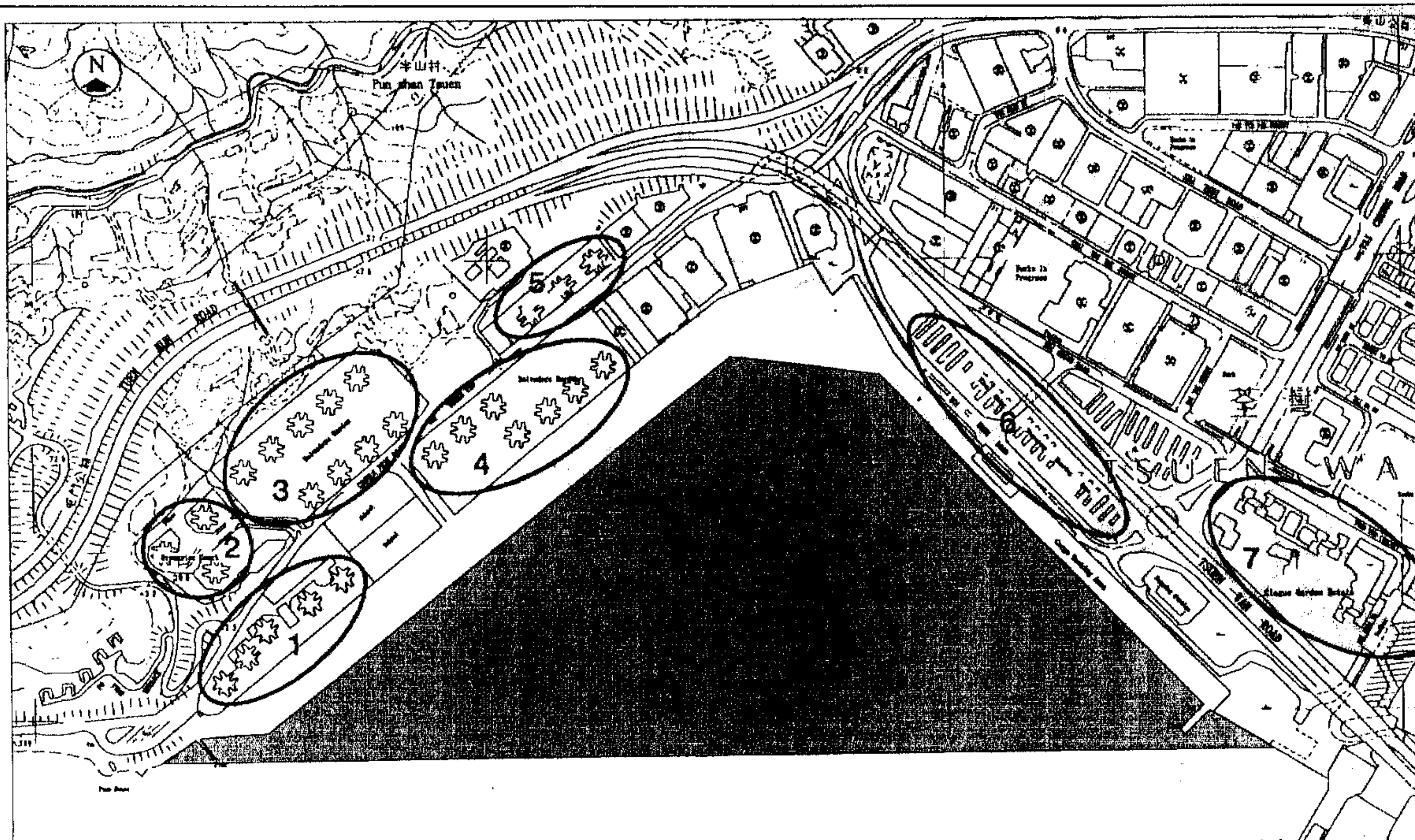
3 W S Atkins (1990): **Yau Kom Tau Water Treatment Works Risk Assessment, a report** prepared for WSD under contract CE 10/87.

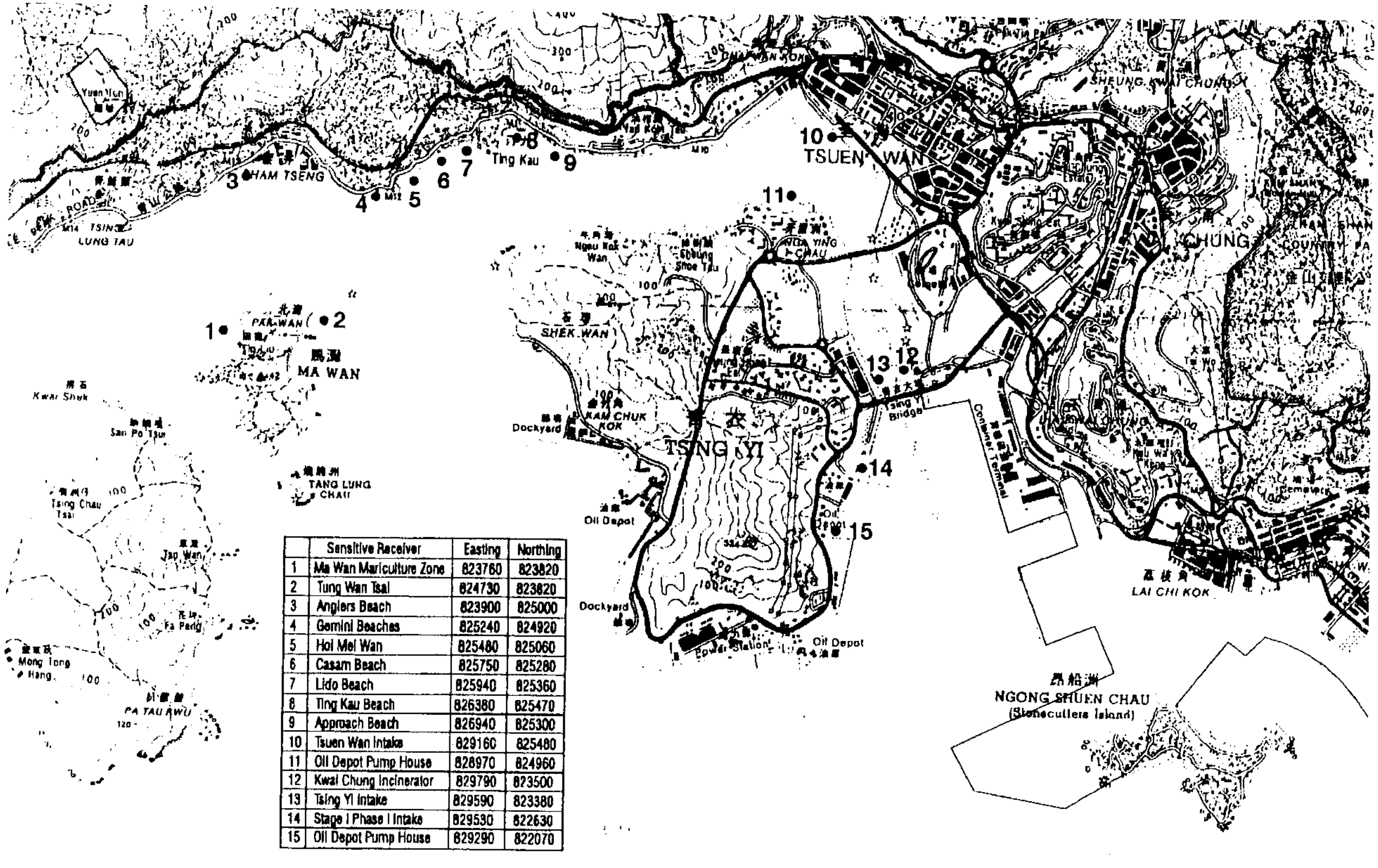
4 Maunsell Consultants Asia Ltd (1995): **Feasibility Study of Castle Peak Road Improvements - Hazard Assessment,** Final Report Volume 4 prepared for Highways Department under contract CE 39/94 and dated December 1996.




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 | FIGURE 4.1 |
|---|---|
| LOCATIONS OF EXISTING TERRESTRIALSENSITIVE RECEIVERS | SCALE NOT TO SCALE |

B010




| | 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 |

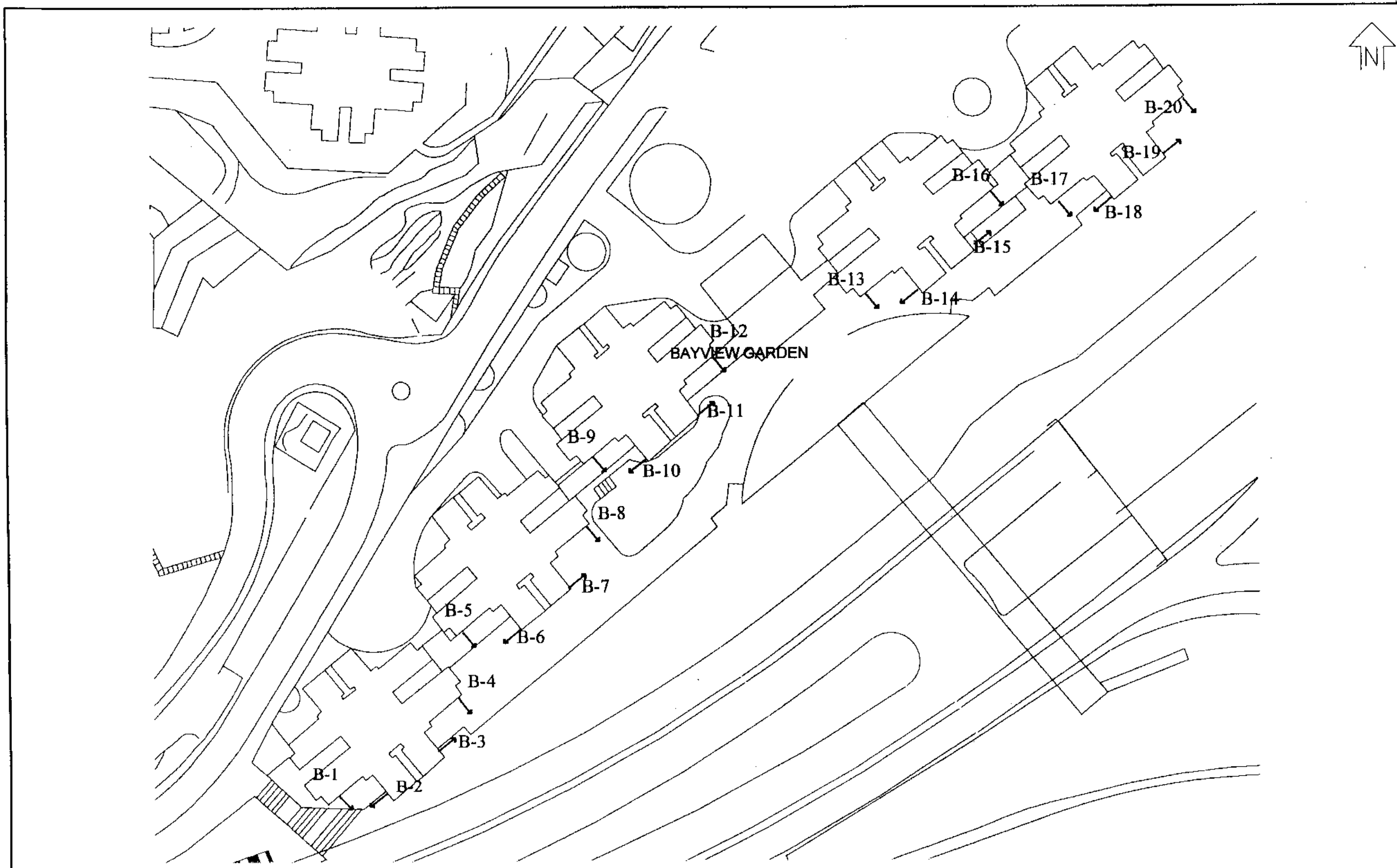
TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

LOCATIONS OF EXISTING MARINE SENSITIVE RECEIVERS

FIGURE 4.2

SCALE NOT TO SCALE

B010



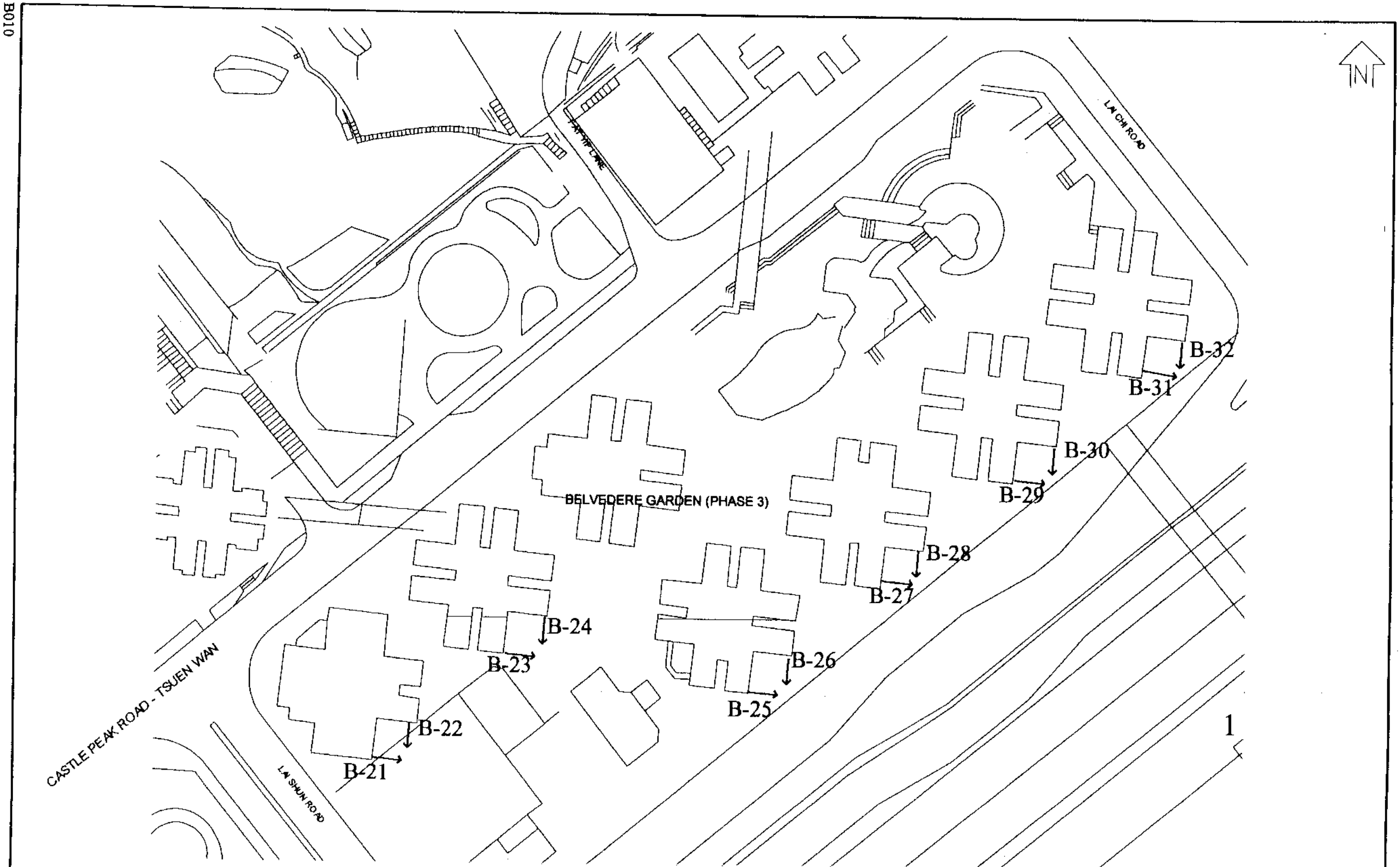

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

EXISTING NOISE SENSITIVE RECEIVERS IN BAYVIEW GARDEN

FIGURE 4.3

SCALE 1 :1100

B010

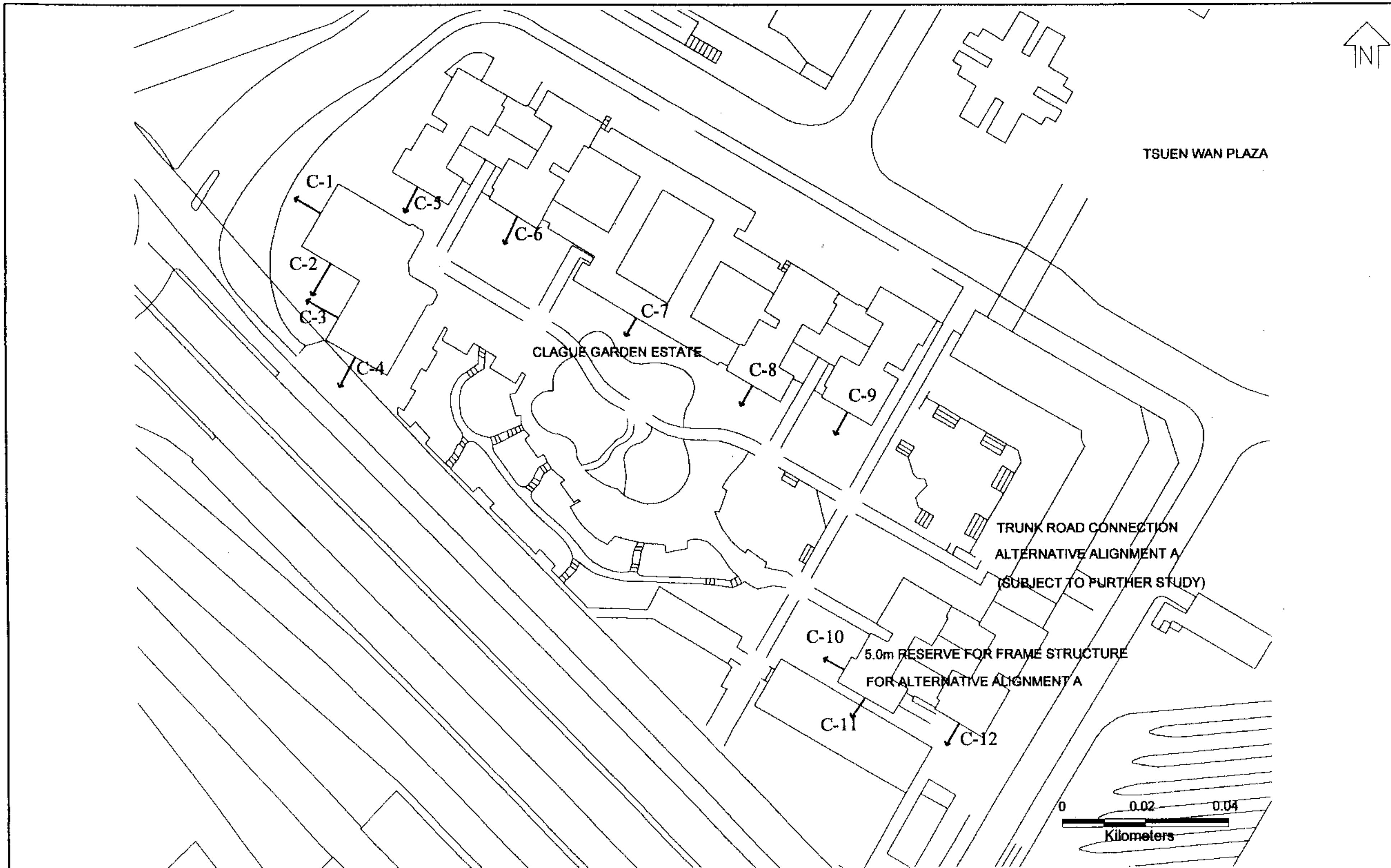



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

EXISTING NOISE SENSITIVE RECEIVERS IN BELVEDERE GARDEN (PHASE 3)

| | |
|---|---|
| FIGURE | 4.4 |
| SCALE | 1 :1300 |

B010

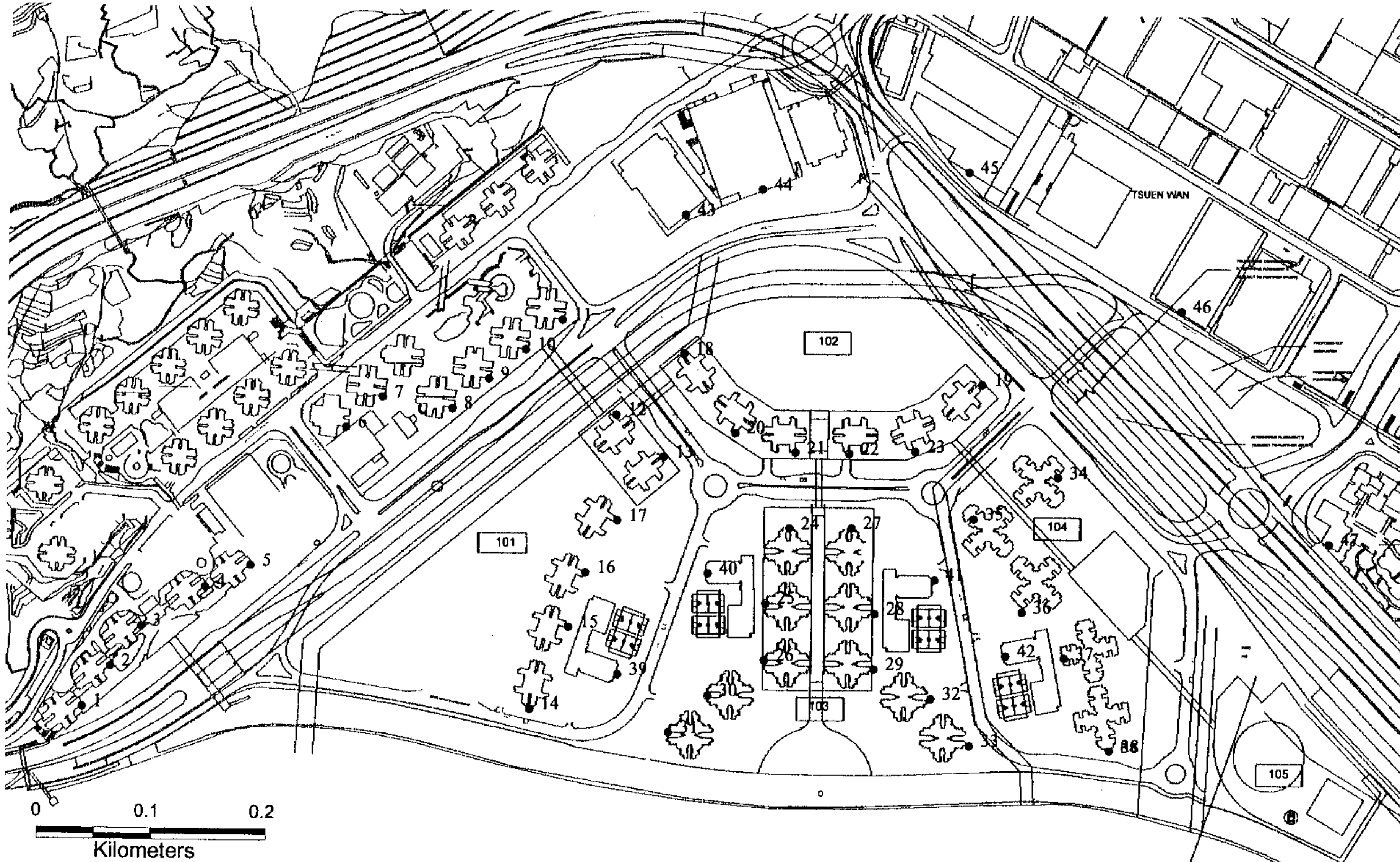



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

EXISTING NOISE SENSITIVE RECEIVERS IN CLAGUE GARDEN ESTATE

| | |
|---|---|
| FIGURE | 4.5 |
| SCALE | 1 : 1300 |

B010

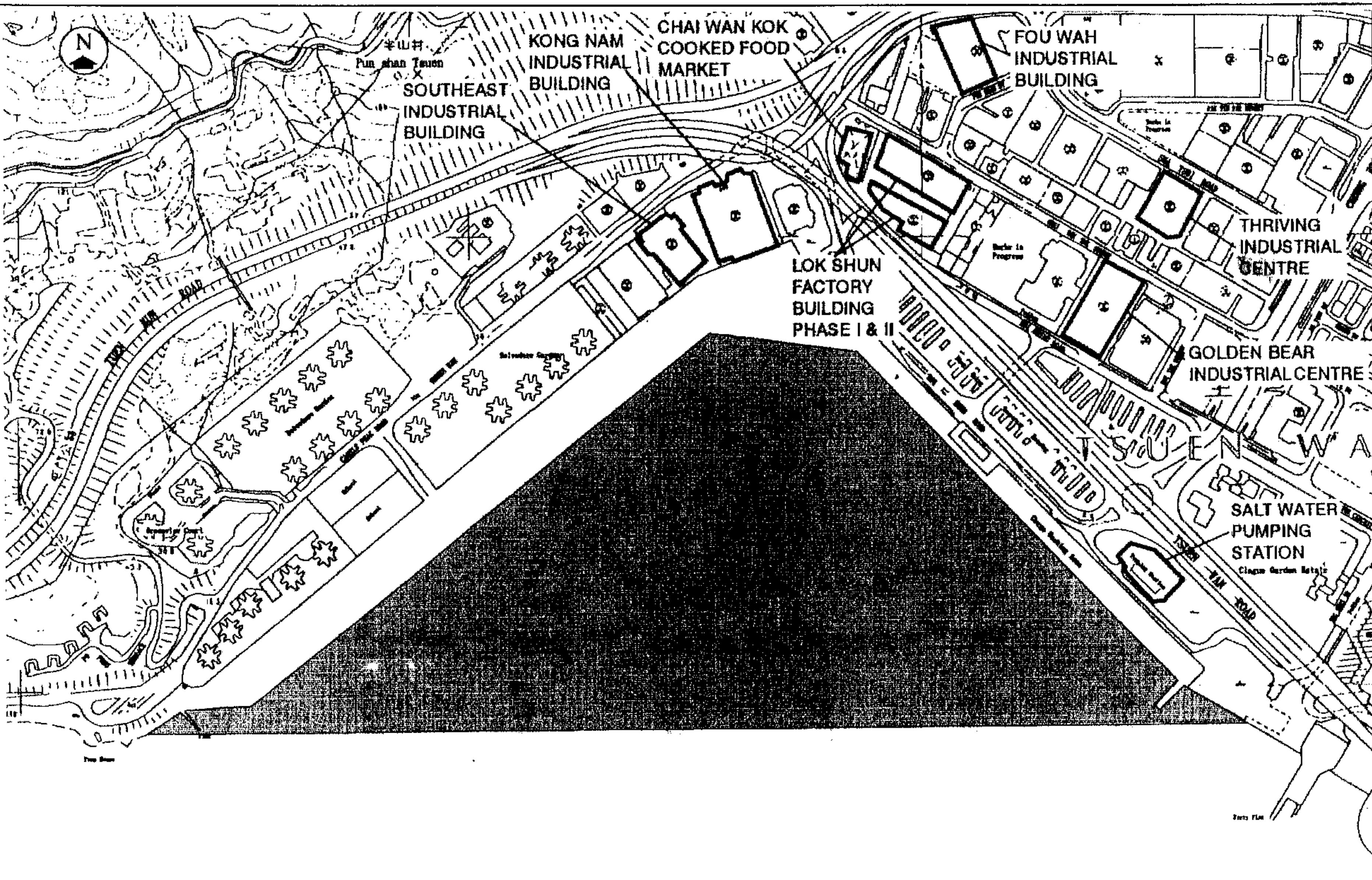



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

LOCATIONS OF THE SELECTED REPRESENTATIVE AIR SENSITIVE RECEIVERS

| | |
|---|---|
| FIGURE | 4.6 |
| SCALE | 1 : 5000 |

B010



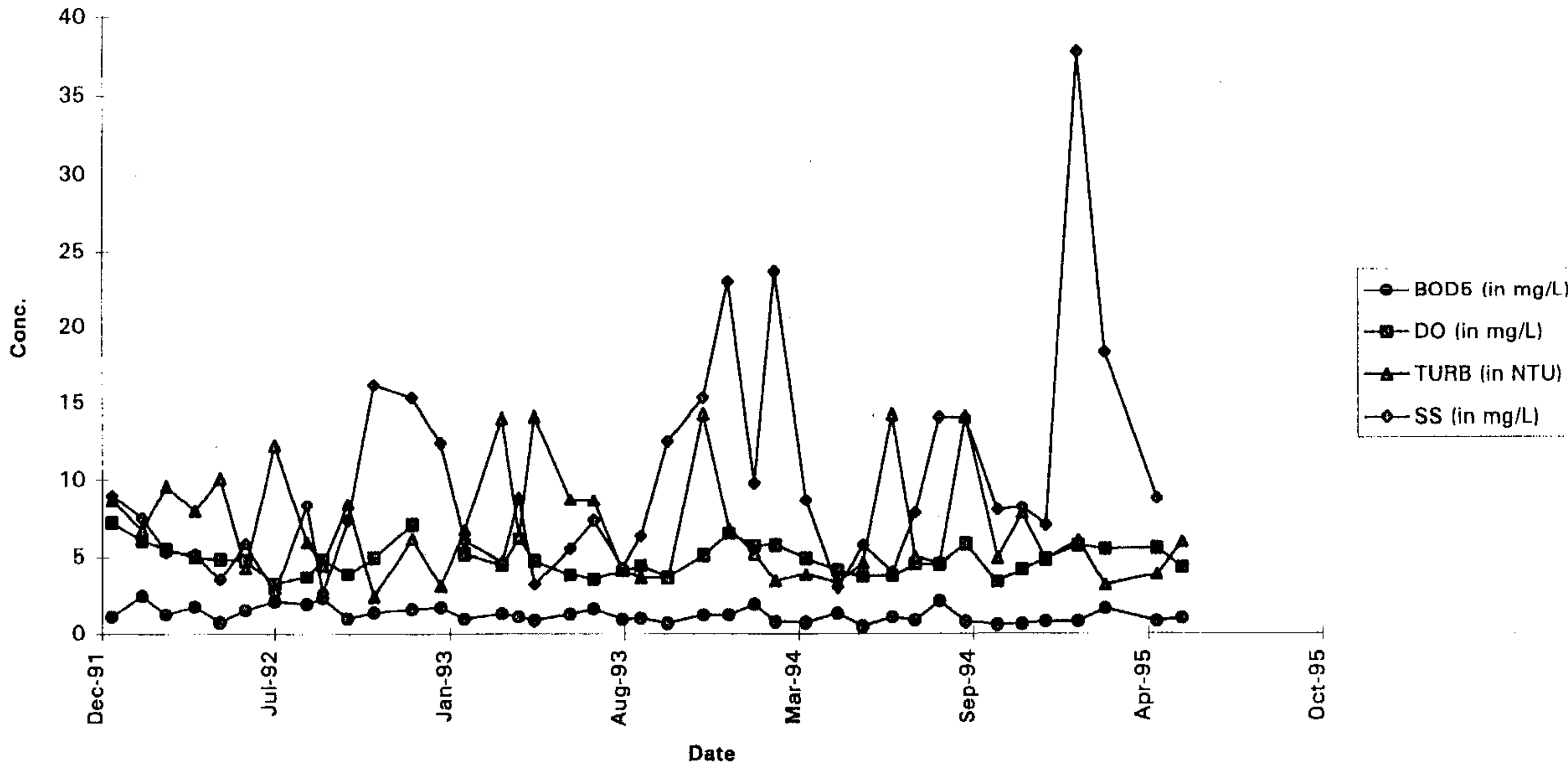

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

LOCATIONS OF POTENTIALSOURCES OF AIR POLLUTION

FIGURE 4.7

SCALE NOT TO SCALE

B010



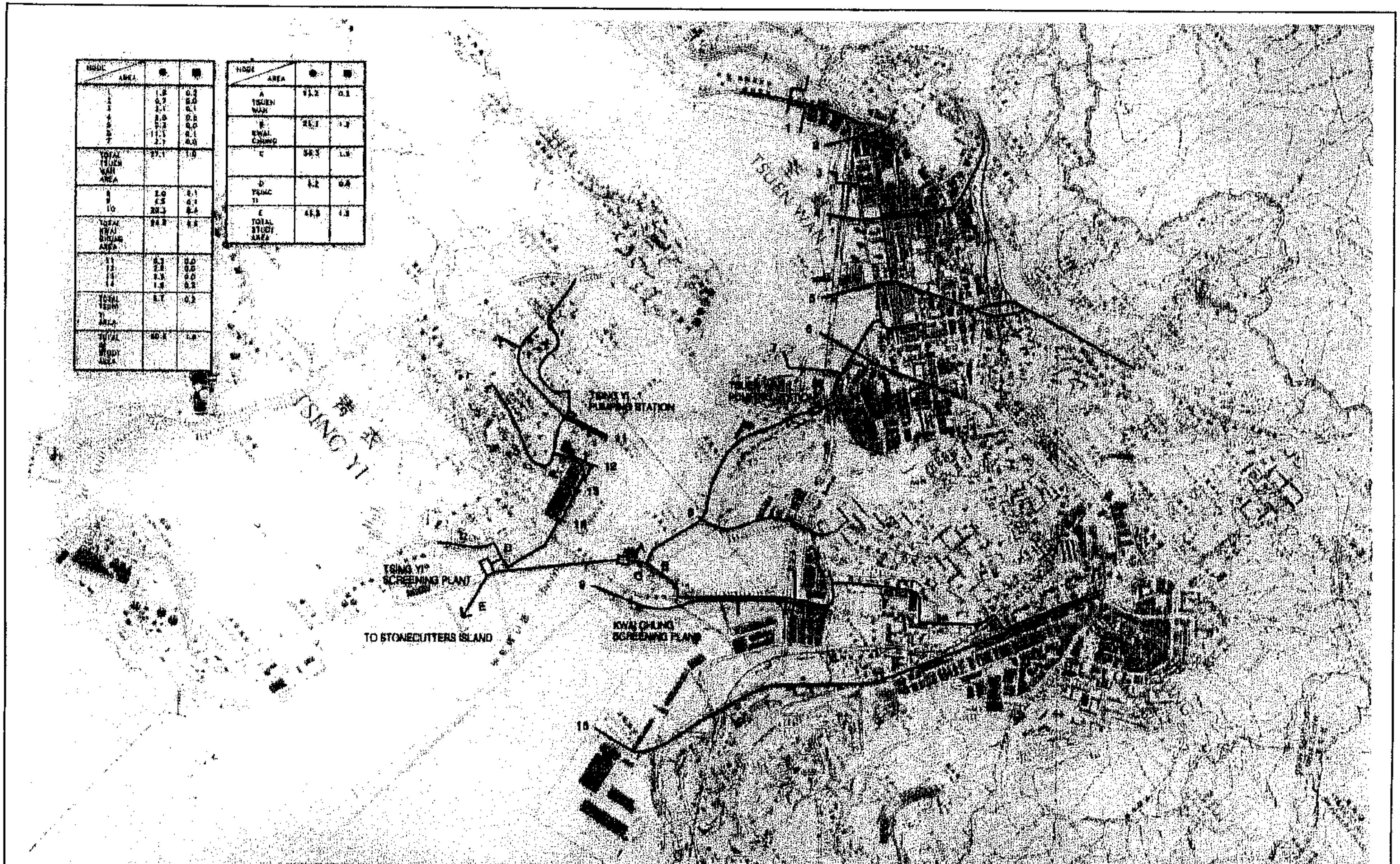

TSUEN WAN BAY FURTHER RECLAMATION, AREA35

DEPTH AVERAGED WATER QUALITY AT STATION VM14

FIGURE 4.8

SCALE NOT TO SCALE

B010



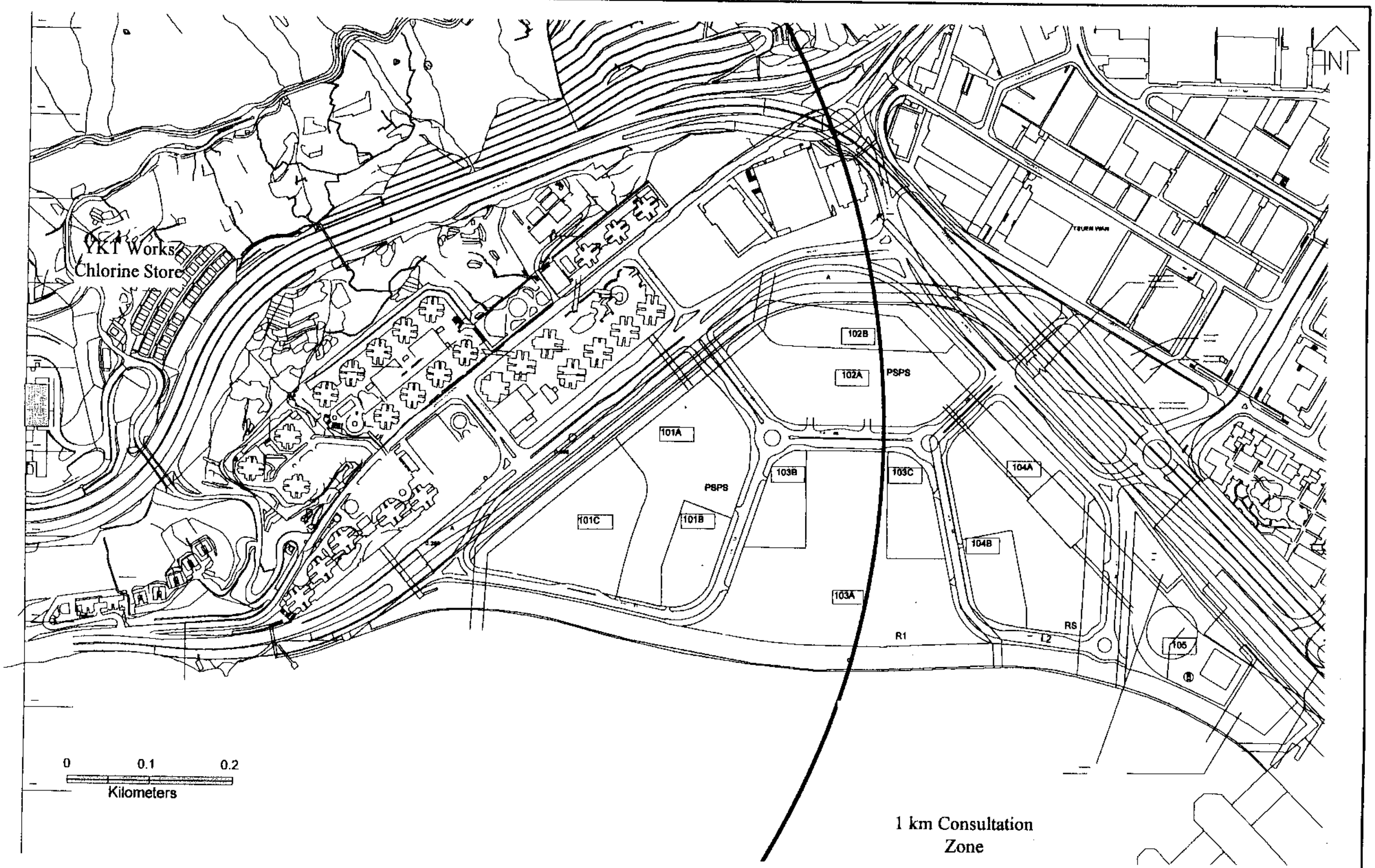

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

POLLUTION LOADS TO THE RAMBLER CHANNEL

FIGURE 4.9

SCALE NOT TO SCALE

B010




| | | |
|---|---|---|
| TSUEN WAN BAY FURTHER RECLAMATION, AREA 35 | FIGURE | 4.10 |
| LOCATION OF YAU KOM TAU WORKS AND TSUEN WAN BAY | SCALE | 1 : 6500 |

# 5 NOISE ASSESSMENT

## 5.1 Construction Phase Impacts

*Introduction*

5.1.1 The methodology outlined in the *Technical Memorandum on Noise from Construction Works other than Percussive Piling* was used for the assessment of construction noise. Notional noise sources for different construction areas were assumed in accordance with the *Technical Memorandum*. All items of powered mechanical equipment (PME) were assumed to be located at these notional source positions. Sound power levels (SWLs) of PME were taken from Table 3 of the *Technical Memorandum*, and best estimates were made by the Engineer for items not listed.

5.1.2 Assessment was carried out on the basis of cumulative SWLs of PME likely to be in concurrent use for any given phase of the construction programme. In order to predict noise levels as realistically as possible, PME were divided into seven 'Construction Noise Phase' groups, each comprising plant programmed to be in concurrent use across the entire site. Concurrent activities were established according to the tentative reclamation construction programme presented in Figure 8.11 of the Tsuen Wan Bay Further Reclamation Area 35 draft Final Report Issue 1, which is reproduced as **Figure 2.5** in this report. Notional sources of these concurrent reclamation activities were spatially separated across the site. Therefore, for each phase of concurrent reclamation activities, noise levels at any given NSR were calculated as a cumulative result of noise generated at different notional sources across the site. The objective of this exercise was to identify a worst case scenario representing those items of PME to be used concurrently at any given time over the entire duration of the reclamation construction programme. These PME lists and the reclamation tasks they represent are indicated in **Tables 5.1 - 5.7**.

5.1.3 It is understood that the construction of the reclamation road network would be subsequent to reclamation works. Again, PME were divided into groups required for separate road construction tasks, where these were expected to be temporally discrete. These PME lists and the tasks they represent are set out in **Tables 5.8 - 5.10**.

5.1.4 Co-ordinates, elevations and distances of all selected representative noise sensitive receivers (NSRs) relative to all notional sources are presented in **Appendix A1**. NSRs locations are indicated in **Figure 5.1**.

5.1.5 Notional noise sources - and therefore distances to NSRs from these notional sources - were calculated on the basis of the best information available at the time of writing. Twelve NSRs were identified in accordance with the requirements of the *Technical Memorandum* (identified as CN1 - CN12). It is understood at this stage that all construction works will be confined to day time hours (07:00 - 19:00) on normal week days, and would therefore fall outside statutory control by Construction Noise Permit (CNP) under the NCO. As such, with the exception of NSR CN11 (a school on the Clague Garden Estate), the criterion adopted for the current assessment was EPD's non-statutory guideline for normal daytime hours of 75 dB(A). The assessment criterion for CN11 was EPD's non-statutory guideline for schools during normal daytime hours of 70 dB(A).

**Table 5.1 Concurrently Operated Powered Mechanical Equipment Used for Reclamation Works - Construction Noise Phase #1**

| PME Item | TM Ref. | No. Items | SWL/Item, dB(A) |
|---|---|---|---|
| *Placement of Sand Fill in Area 35* | | | |
| Tug boat | CNP 221 | 3 | 110 |
| *Seawall Dredging* | | | |
| Dredger, grab | CNP 063 | 2 | 112 |
| *Seawall Construction* | | | |
| Derrick barge | CNP 061 | 1 | 104 |
| Tug boat | CNP 221 | 2 | 110 |
| *Placement of Further Sand Fill in Area 35* | | | |
| Tug boat | CNP 221 | 2 | 110 |

**Table 5.2 Powered Mechanical Equipment Used for Vertical Band Drain Installation: Area A - Construction Noise Phase #2**

| PME Item | TM Ref. | No. Items | SWL/Item, dB(A) |
|---|---|---|---|
| Vertical band drain installation rig | N/A | 2 | 112* |

Note: * Estimate

**Table 5.3 Concurrently Operated Powered Mechanical Equipment Used for Reclamation Works - Construction Noise Phase #3**

| PME Item | TM Ref. | No. Items | SWL/Item, dB(A) |
|---|---|---|---|
| *Placement of public dump and seawall buildup: Area A* | | | |
| Derrick barge | CNP 061 | 2 | 104 |
| Dump truck | CNP 067 | 2 | 117 (110) |
| *Installation of vertical band drains: Area C* | | | |
| Vertical band drain installation rig | N/A | 2 | 112* |

Note: Values in parenthesis represent quieter alternative plant (Source: BS5228 - Noise control on construction and open sites - Item 60, Table 7)
* Estimate

**Table 5.4 Concurrently Operated Powered Mechanical Equipment Used for Reclamation Works - Construction Noise Phase #4**

| PME Item | TM Ref. | No. Items | SWL/Item, dB(A) |
|---|---|---|---|
| *Placement of surcharge: Area A* | | | |
| Dump truck | CNP 067 | 2 | 117 (110) |
| *Surcharge maintenance period: Area A* | | | |
| Dump truck | CNP 067 | 5 | 117 (110) |
| *Placement of public dump: Area C* | | | |
| Derrick barge | CNP 061 | 1 | 104 |
| Dump truck | CNP 067 | 1 | 117 (110) |
| *Sand fill placement: Area D* | | | |
| Derrick barge | CNP 061 | 1 | 104 |
| Tug boat | CNP 221 | 2 | 110 |
| Dump truck | CNP 067 | 5 | 117 (110) |

Note: Values in parenthesis represent quieter alternative plant (Source: BS5228 - Noise control on construction and open sites - Item 60, Table 7)
* Estimate

**Table 5.5 Concurrently Operated Powered Mechanical Equipment Used for Reclamation Works - Construction Noise Phase #5**

| PME Item | TM Ref. | No. Items | SWL/Item, dB(A) |
|---|---|---|---|
| *Removal of surcharge: Area A* | | | |
| Dump truck | CNP 067 | 5 | 117 (110) |
| *Placement of surcharge: Area C* | | | |
| Dump truck | CNP 067 | 1 | 117 (110) |
| *Installation of vertical drains: Area D* | | | |
| Vertical band drain installation rig | N/A | 1 | 112* |
| *Placement of public dump and surcharge fill: Area D* | | | |
| Dump truck | CNP 067 | 5 | 117 (110) |
| *Installation of vertical drains: Area E* | | | |
| Vertical band drain installation rig | N/A | 2 | 112* |

Note: Values in parenthesis represent quieter alternative plant (Source: BS5228 - Noise control on construction and open sites - Item 60, Table 7)
* Estimate

**Table 5.6 Concurrently Operated Powered Mechanical Equipment Used for Reclamation Works - Construction Noise Phase #6**

| PME Item | TM Ref. | No. Items | SWL/Item, dB(A) |
|---|---|---|---|
| *Surcharge maintenance period: Area C* | | | |
| Dump truck | CNP 067 | 1 | 117 (110) |
| *Surcharge removal: Area C* | | | |
| Dump truck | CNP 067 | 1 | 117 (110) |
| *Surcharge maintenance: Area D* | | | |
| Dump truck | CNP 067 | 5 | 117 (110) |
| *Surcharge removal: Area D* | | | |
| Dump truck | CNP 067 | 5 | 117 (110) |
| *Placement of public dump and surcharge fill: Area E* | | | |
| Derrick barge | CNP 061 | 1 | 104 |
| Dump truck | CNP 067 | 5 | 117 (110) |

Note: Values in parenthesis represent quieter alternative plant (Source: BS5228 - Noise control on construction and open sites - Item 60, Table 7)

**Table 5.7 Powered Mechanical Equipment Used for Surcharge Removal: Area E - Construction Noise Phase #7**

| PME Item | TM Ref. | No. Items | SWL/Item, dB(A) |
|---|---|---|---|
| Dump truck | CNP 067 | 5 | 117 |

**Table 5.8 Concurrently Operated Powered Mechanical Equipment Used for Reclamation Road Construction - Preparation Works**

| PME Item | TM Ref. | No. Items | SWL/Item, dB(A) |
|---|---|---|---|
| Excavator | CNP 081 | 2 | 112 |
| Air Compressor | CNP 001 | 1 | 100 |
| Breaker, hand-held | CNP 026 | 1 | 114 |
| Lorry | CNP 141 | 1 | 112 |

**Table 5.9 Concurrently Operated Powered Mechanical Equipment Used for Reclamation Road Construction - Structural Works**

| PME Item | TM Ref. | No. Items | SWL/Item, dB(A) |
|---|---|---|---|
| Excavator | CNP 081 | 1 | 112 |
| Air Compressor, air flow | CNP 001 | 1 | 100 |
| Bar bender and cutter | CNP 021 | 1 | 90 |
| Generator, standard | CNP 101 | 1 | 108 |
| Concrete lorry mixer | CNP 044 | 2 | 109 |
| Compactor, vibratory | CNP 050 | 2 | 105 |
| Saw, circular, wood | CNP 201 | 1 | 108 |
| Lorry | CNP 141 | 1 | 112 |
| Roller, vibratory | CNP 186 | 1 | 108 |

**Table 5.10 Concurrently Operated Powered Mechanical Equipment Used for Reclamation Road Construction - Surfacing Works**

| PME Item | TM Ref. | No. Items | SWL/Item, dB(A) |
|---|---|---|---|
| Excavator | CNP 081 | 2 | 112 |
| Roller, vibratory | CNP 186 | 1 | 108 |
| Lorry | CNP 141 | 1 | 112 |
| Asphalt Paver | CNP 004 | 1 | 109 |

5.1.6 Worst case construction noise levels were calculated at all twelve representative NSRs overlooking the proposed reclamation site, and these are indicated in **Figure 5.1**. For the purposes of assessment it was assumed that all PME were in direct line-of-sight of the NSR. A positive facade correction of 3 dB(A) was made to all cumulative totals calculated for a given task, in accordance with the *Technical Memorandum*.

5.1.7 **Tables 5.11 - 5.12** set out noise levels predicted to result from worst case concurrent construction works. These predicted noise levels were calculated on the assumption that no mitigation measures were in place.

*Reclamation Impacts on Residential NSRs*

5.1.8 With respect to noise levels arising from reclamation activities, the results presented in **Table 5.11** demonstrate that, despite the large scale of the works, exceedances of the non-statutory day time limit of 75 dB(A) would occur at only four of the selected representative NSRs (CN7, CN8, CN9, CN10 - ie Belvedere Gardens). However, it can be seen that none of these NSRs would suffer exceedances for the duration of the reclamation works: NSRs CN8, CN9 and CN10 would be affected by three construction noise phases, whilst NSRs CN7 would only be affected by one construction noise phase. Further, all exceedances would be due only to three construction noise phases: Phases

#4, #5 and #6. With one exception, all predicted exceedances would be less than 5 dB(A). Noise levels from the four remaining construction noise phases were predicted to comply with non-statutory limits at all NSRs.

**Table 5.11 Predicted Noise Levels Due to Concurrent Reclamation Construction Phases**

| NSR ID | NSR Type | Noise Limit | Predicted Noise Level Per Construction Phase, dB(A) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Phase #1 | Phase #2 | Phase #3 | Phase #4 | Phase #5 | Phase #6 | Phase #7 |
| CN1 | Residential | 75 | 64.0 | 50.9 | 59.4 | 65.9 | 65.6 | 68.1 | 62.3 |
| CN2 | Residential | 75 | 68.0 | 52.1 | 61.1 | 67.3 | 67.0 | 69.6 | 64.0 |
| CN3 | Residential | 75 | 69.1 | 52.4 | 61.8 | 67.8 | 67.6 | 70.2 | 64.4 |
| CN4 | Residential | 75 | 70.1 | 52.7 | 62.5 | 68.4 | 68.2 | 70.9 | 64.9 |
| CN5 | Residential | 75 | 71.8 | 53.4 | 64.0 | 69.7 | 69.4 | 72.2 | 65.9 |
| CN6 | Residential | 75 | 73.1 | 53.9 | 65.3 | 70.7 | 70.5 | 73.3 | 66.7 |
| CN7 | Residential | 75 | 69.6 | 56.1 | 67.7 | 75.0 | 74.9 | **77.8** | 69.5 |
| CN8 | Residential | 75 | 68.3 | 56.4 | 66.8 | **75.9** | **75.7** | **78.5** | 69.7 |
| CN9 | Residential | 75 | 67.0 | 56.7 | 66.0 | **77.1** | **77.0** | **79.8** | 69.7 |
| CN10 | Residential | 75 | 65.8 | 57.0 | 65.3 | **78.6** | **78.5** | **81.2** | 69.6 |
| CN11 | School | 70 | 69.2 | 65.9 | **71.2** | **77.0** | **75.9** | **73.0** | 67.6 |
| CN12 | Residential | 75 | 67.5 | 62.1 | 67.4 | 73.4 | 72.3 | 70.4 | 65.5 |

Note: Predicted exceedances of 75 dB(A) - or 70 dB(A) limit are bolded and shaded

**Table 5.12 Predicted Noise Levels Due to Reclamation Road Construction**

| NSR ID | NSR Type | Noise Limit | Predicted Noise Level Construction Phase, dB(A) | | |
|---|---|---|---|---|---|
| | | | Preparation Works | Structural Works | Surfacing Works |
| CN1 | Residential | 75 | 63.0 | 63.0 | 62.2 |
| CN2 | Residential | 75 | 66.8 | 66.8 | 66.1 |
| CN3 | Residential | 75 | 68.0 | 68.0 | 67.2 |
| CN4 | Residential | 75 | 69.2 | 69.2 | 68.4 |
| CN5 | Residential | 75 | 71.5 | 71.5 | 70.7 |
| CN6 | Residential | 75 | 72.8 | 72.8 | 72.0 |
| CN7 | Residential | 75 | 68.7 | 68.7 | 67.9 |
| CN8 | Residential | 75 | 70.3 | 70.3 | 69.5 |
| CN9 | Residential | 75 | 71.9 | 71.9 | 71.2 |
| CN10 | Residential | 75 | 73.1 | 73.1 | 72.3 |
| CN11 | School | 70 | 68.6 | 68.6 | 67.9 |
| CN12 | Residential | 75 | 66.0 | 66.0 | 65.2 |

*Reclamation Impacts on School NSR (CN11)*

5.1.9 NSR CN11 represents Ng Kwok Wai Memorial Kindergarten situated within the Clague Garden Estate. Baseline traffic noise measurements made in 1994 indicated that during peak morning traffic flow, noise levels at the facade of this NSR reached 72.8 dB(A). EPD's normal non-statutory day time limit for schools is 70 dB(A), although this falls to 65 dB(A) during periods of examination. The results presented in **Table 5.11** demonstrate that although exceedances would be caused over four construction noise phases (Phase #3, Phase #4, Phase #5 and Phase #6), noise levels were predicted to be acceptable during the remaining three construction noise phases. The highest noise level was predicted to be 77 dB(A) during the Phase #4 reclamation works. However, predicted noise levels should be set in the context of likely high existing background noise levels.

*Reclamation Road Construction Impacts on all NSRs*

5.1.10 With respect to construction noise impacts arising from reclamation road works, it can be seen from **Table 5.12** that noise levels would comply with non-statutory guidelines at all NSRs.

5.1.11 It should be noted that these construction noise assessment results are conservative in some aspects:

- it is assumed that all PME required for discrete construction tasks/phases will operate concurrently during these tasks;
- it is assumed that all PME will be located together at the notional source;
- it is assumed that the high SWL quoted in the Technical Memorandum for dump trucks (117 dB(A)) refers to the activity of dumping itself - therefore, although it is likely that the quoted numbers of dump trucks will be in operation concurrently, it is unlikely that all would be dumping at the same time; and
- in those cases where the NSR is a high rise residential development, distances (and therefore calculated noise levels) have been calculated as minimums to the lowest floors.

*Mitigation Proposals*

5.1.12 The construction noise assessment has been conducted on the basis of a worst case scenario for each task (ie. all items of PME assumed to be concurrently operational at the notional source). As indicated in **Table 5.11**, five of the selected representative NSRs would experience noise levels in exceedance of the non-statutory limits at some time during the reclamation programme. Due to the particular circumstances of this project (size of the site, height of NSRs, mobile nature of most PME) it would not be practical to recommend conventional mitigation measures such as acoustic enclosures for PME items, or acoustic barriers at the site boundary.

5.1.13 However, if quieter plant was used at the site noise levels would be correspondingly lower. For example, it may be possible to replace dump trucks with quieter alternatives, such as those indicated in **Tables 5.3 - 5.6**. **Table 5.13** sets out these mitigated noise levels at those NSRs otherwise expected to suffer exceedances during specific construction phases. Under this scenario it can be seen that with the exception of NSR CN11, noise levels would fall to acceptable levels at all NSRs for construction phases previously identified as problematic. At NSR CN11 noise levels would be acceptable outside examination periods.

**Table 5.13 Predicted Noise Levels Due to Concurrent Reclamation Construction Phases Using Quieter Alternative Plant**

| NSR ID | NSR Type | Noise Limit | Predicted Noise Level Per Construction Phase, dB(A) | | | |
|---|---|---|---|---|---|---|
| | | | Phase #3 | Phase #4 | Phase #5 | Phase #6 |
| CN7 | Residential | 75 | 66.9 | 69.0 | 69.0 | 70.8 |
| CN8 | Residential | 75 | 65.6 | 69.9 | 69.9 | 71.6 |
| CN9 | Residential | 75 | 64.4 | 71.2 | 71.1 | 72.8 |
| CN10 | Residential | 75 | 63.3 | 72.8 | 72.5 | 74.2 |
| CN11 | School | 70[1] | 63.6 | 68.9 | 68.1 | 65.8 |

Note: 1 - 65 dB(A) during periods of examination

5.1.14 Further, there are many good site practices which would serve to reduce noise levels. Consequently, it is strongly recommended that any appointed contractor should observe the following measures.

- 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;
- 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

5.1.15 It is also recommended that the appointed contractor should liaise with the management of the Ng Kwok Wai Memorial Kindergarten to ensure that noisy construction tasks are programmed not to coincide with periods of examinations, where these exist.

## 5.2 Operational Phase Impacts

*Introduction*

5.2.1 Major traffic noise sources in the area are road traffic along the elevated Tsuen Wan Road, Hoi On Road and Hoi Hing Road. In anticipation of the high level of traffic noise on these major roads, significant setbacks from the carriageways have been incorporated into the planning layout of land uses in the area. Adoption of the tunnel bypass arrangement in the MDP also helps to contain the noise problem. Planned district distributor roads are predicted to have moderate traffic flows, but their close proximity to the proposed residential dwellings may impose significant noise impacts to nearby facades. Local roads, on the other hand, are predicted to have fairly low traffic flow and are not expected to generate significant noise problems.

5.2.2 It is the current policy that where noise sensitive uses are potentially exposed to noise levels in exceedance of HKPSG criteria due to the development of new roads, all feasible mitigation options should be tested in order to reduce noise levels to meet the HKPSG noise standards. Since the use of friction course is not practicable on roads with frequent stopping and braking of vehicles, it would not be tested for new distributor and local roads. In this study, the provision of direct mitigation measures such as vertical roadside barriers and canopy type barriers has been explored as far as possible.

5.2.3 In general, vertical roadside barriers along district distributor and local roads are effective at lower storeys, but are ineffective at highrise facades, due to the proximity of the buildings to these roads. Interference with firefighting operations, road safety requirements, emergency and pedestrian access at ground level are other factors to be considered in proposing barriers on new roads. Consequently, the practicability of barriers on new roads has to be considered on a case-by-case basis. When barriers on new roads are infeasible, other mitigation measures within the development site such as the use of podia, cantilever barriers set atop podia and window orientation would be considered.

5.2.4 The HKPSG states that, if compromise is necessary, an attempt should be made to maximize the proportion of dwellings protected using self-protecting building design (such as single aspect buildings) or integrated building/source design. These requirements for self-protecting buildings and layouts however, may place significant constraints on the potential of the development. Where these direct technical remedies are ineffective, residual noise levels may be mitigated at the building facade using appropriate glazing and air conditioning.

5.2.5 In the following sections, major road noise constraints likely to be imposed on the development site and the proposed mitigation measures are discussed. The areas of concern for the new development are the proposed residential land use at sites:

- 101 - designated for Private Sector Participation Scheme (PSPS);
- 102 - designated for Private Sector Participation Scheme (PSPS);
- 103 - designated as Residential Zone 1 (R1); and
- 104 - designated as Rental Housing (RS) site.

The locations of representative noise sensitive receivers in these sites are shown in **Figures 5.2 to 5.4**. Impacts on these receivers are discussed first and impacts on those existing sensitive receivers (**Figures 5.5 and 5.6**) are discussed in subsequent sections.

5.2.6 In addition, the noise assessment results for two primary and two secondary schools proposed for the development will be discussed. The noise impact of new roads on existing NSRs and the eligibility for compensation have also been investigated.

*Site 101 (PSPS)*

5.2.7 The region is bounded by Hoi On Road, distributor road D1 and local road L1. In anticipation of the high level of traffic noise on the existing Hoi On Road, significant setbacks from this carriageway have been incorporated into the planning layout of residential blocks. The predicted noise levels at representative facades are shown in **Appendix A3**. Compliance with the HKPSG noise standards has been predicted for most of these selected facades. It is estimated that approximately 50 units will have unmitigated noise levels in excess of 70 dB(A).

5.2.8 The maximum unmitigated noise level is predicted to be 72.7 dB(A) for the lower floors at facade position A1-21 in Block F due to its close proximity to Road L1. Soil berm of 3 m height along the affected section of Road L1 has been tested and shown to be effective in reducing the predicted noise level to below 70 dB(A). Alternatively, the non-compliance can be resolved by relocating the openable window (A1-21) facing Road L1 to the side with a smaller angle of exposure to traffic on Road L1. Since a soil berm of 3m in height would require a base berm of 7m wide, the option of window re-orientation is recommended in order to maximize the development potential of the site (**Figure 5.2**).

5.2.9 Slight exceedance of the HKPSG by less than 1 dB(A) is predicted for the lower floors at facades A1-2 and A1-3 in Block A facing Road D1. This non-compliance can be resolved by extending the proposed podium 10m closer towards Road D1 (**Figure 5.2**). Alternatively, an increase of 5 m in setback from Road D1 has been shown to be sufficient to overcome the non-compliance.

5.2.10 Noise impacts from Hoi On Road are most significant at nearby facades in Block A represented by A1-9. Exceedances of the HKPSG noise standards by 1 to 2 dB(A) have been predicted for the lower 20 floors. Since there is no current policy to apply retro-active mitigation to existing roads, noise barriers have not been proposed on Hoi On Road. To overcome the non-compliance at these facades, the openable windows at A1-9 facing Hoi On Road are recommended to be relocated to the side with a smaller angle of exposure to traffic on Hoi On Road (**Figure 5.2**). With the measure, no residential flats are predicted to have mitigated noise levels above 70 dB(A) in this site (**Table 5.13**).

*Site 102 (PSPS)*

5.2.11 The region is bounded by major existing roads (Hoi On Road, Hoi Hing Road, and Tsuen Wan Road) to the north and new distributor roads to the south. Most of the residential blocks are proposed along distributor roads with significant setback from major roads with high level of traffic. Podium structures have also been proposed to alleviate noise from adjacent distributor roads. The predicted noise levels at representative facades are shown in **Appendix A3**. Compliance with the HKPSG has been predicted for most of these representative facades using 2011 traffic flows. Nonetheless, selected facades near major roads are predicted with noise levels in excess of 70 dB(A). Approximately 565 residential units in this site are predicted to have unmitigated noise levels above the HKPSG noise standards.

5.2.12 Exceedances of the HKPSG by 3 dB(A) are predicted for facades (A2-1, A2-2, A2-3, A2-5 and A2-34) in Block A affected by Hoi On Road and Road D1. Approximately 90 units of this block are predicted to have noise levels above 70 dB(A) for the unmitigated scenario. It is proposed that the podium to be extended 10m closer to these roads in order to alleviate noise impacts from them. Furthermore, the openable window at A2-5 can be relocated to the side to minimize its exposure to Hoi On Road (**Figure 5.3**). As a result of these measures, the number of flats with predicted noise levels in excess of 70 dB(A) is reduced to 30 units (**Table 5.14**).

5.2.13 For facades (A2-13, A2-15 and A2-16) in Block C that are exposed to traffic on Hoi On and Hoi Hing Roads, slight exceedances of the HKPSG noise standards by at most 1 dB(A) have been predicted for the unmitigated scenario. By locating the openable windows at these facades to the side with a smaller angle of exposure to road traffic, these facades (approximately 100 units) are predicted to comply with the HKPSG noise standards. Therefore, window reorientation at this Block is proposed to reduce noise levels at all flats to below 70 dB(A).

5.2.14 For those residential blocks D and E closer to Hoi Hing Road (represented by A2-20, A2-21, A2-24, and A2-25), window reorientation is predicted to be insufficient to reduce the cumulative noise levels to below 70 dB(A) due to the dominant noise contributions from the existing Tsuen Wan Road. Further mitigation to reduce noise impacts from Hoi Hing Road has not been considered since it will reduce the cumulative noise levels by less than 1 dB(A). In fact, noise contribution from Tsuen Wan Road alone is shown in **Appendix A3** to be higher than 70 dB(A). Hence suitable windows and air-conditioning should be provided to these affected facades (approximately 105 units). Exceedance of the HKPSG noise standards has also been predicted for representative facade A2-48 overlooking the roundabout of roads D2 and D3. By relocating the openable window at this facade to the side with a smaller angle of exposure to road traffic, the noise levels at this facade are predicted to be lower than 70 dB(A).

5.2.15 For Block F adjacent to Hoi Hing Road and Tsuen Wan Road (represented by facades A2-28 to A2-32, A2-49 to A2-51), exceedance of the HKPSG noise standards by up to 9 dB(A) has been predicted for selected facades overlooking these major existing roads. Noise barriers on new ramps have not been considered since contribution from traffic on these ramps to the cumulative noise levels is predicted to be less than 1dB(A). Mitigation proposed on new ramps would fail to reduce the cumulative noise levels to the HKPSG standard due to significant noise impacts from the existing roads. In fact, noise levels due to the existing Tsuen Wan Road alone are in excess of 70 dB(A). Hence, suitable window and air conditioning would be required for approximately 240 units of this block that are predicted to have noise levels above 70 dB(A) due to the high level of traffic on the existing Hoi Hing Road and Tsuen Wan Road. Alternatively, single aspect buildings with non-sensitive facades presented towards these existing roads can be considered.

5.2.16 It is estimated that approximately 375 residential units in this site will still have predicted noise levels above 70 dB(A) after the proposed mitigation measures have been adopted. In other words, approximately 190 units will benefit from these measures to meet the HKPSG noise standards **(Table 5.14)**.

*Site 103 (R1)*

5.2.17 The area is quite far away from major roads and is bounded by distributor and local roads only. The site boundary of the development is located at least 150 m away from Hoi On Road and 160 m away from Tsuen Wan Road. As a result, the predicted noise levels based on 2011 traffic flows show that no residential receivers would be exposed to levels in excess of 70 dB(A). Consequently, no mitigation measures need to be considered.

*Site 104 (RS)*

5.2.18 The existing Tsuen Wan Road is the major noise constraint to nearby facades in this area. Approximately, 630 residential units in this site are predicted to have unmitigated noise levels above 70 dB(A). In fact, noise levels in excess of 70 dB(A) are predicted for all representative facades exposed to traffic noise on Tsuen Wan Road **(Appendix A3)**. The maximum noise contribution of 76 dB(A) from Tsuen Wan Road is predicted for facade A4-1 overlooking the existing road network. On the other hand, contribution from new ramps to the cumulative noise level is predicted to be less than 1 dB(A), and mitigation measures proposed on new ramps would therefore be ineffective.

5.2.19 Although the dominant traffic noise contributor is Tsuen Wan Road, contributions of more than 1 dB(A) are predicted from Hoi Hing Road and Road D2 at selected storeys of facades in Block A adjacent to these roads (A4-1 to A4-5). Mitigation measures proposed for these roads may not reduce the cumulative noise levels at these affected facades to meet the HKPSG noise standards, but they have been considered to achieve maximum noise reduction.

5.2.20 Concrete boundary walls of 5m height have been proposed along the site boundary to reduce noise impacts from traffic on Road D2 and Hoi Hing Road (**Figure 5.4**). These boundary walls are predicted to reduce the noise levels at the affected facades (A4-1 to A4-5) in Block A by a maximum of 3 dB(A), but are not sufficient to resolve the non-compliance predicted for these facades (approximately 360 units) due to the high level of traffic noise from the existing Tsuen Wan Road. Since contributions from Road D2 and Hoi Hing Road to the cumulative noise levels at these facades are insignificant, further mitigation on these roads are not proposed. As described above, single aspect buildings with non-sensitive facades presented towards the existing Tsuen Wan Road and/or suitable windows and air-conditioning should be considered.

5.2.21 The close proximity of district distributor road D2 and local road L2 has also caused potential noise problems on nearby facades in Block B. Exceedance of the HKPSG noise standards by 2 dB(A) has been predicted on first floors of facades (A4-8, A4-10, and A4-11) adjacent to D2 and L2. However, 3m high boundary walls on selected sections of L2 and D2 (**Figure 5.4**) are found to be effective in mitigating noise levels at these facades (approximately 40 units) to below 70 dB(A).

5.2.22 For Blocks D and E, approximately 230 units (A4-21 to A4-25) exposed to road traffic on L2 and Tsuen Wan Road are predicted to have noise levels above 70 dB(A). The proposed 3m high boundary walls along sections of L2 (**Figure 5.6**) are sufficient to reduce the cumulative noise levels at about 100 units to below 70 dB(A). Suitable windows and air-conditioning would therefore be required for the remaining 130 units with noise contributions dominated by traffic on the existing Tsuen Wan Road.

5.2.23 As a result of the proposed mitigation measures, the number of residential units that are predicted to have noise levels in excess of 70 dB(A) reduces from 630 (unmitigated scenario) to 490 units in this site (**Table 5.14**).

**Table 5.14 Proposed Mitigation Measures and No. of Flats Exceeding HKPSG**

| Block | Major Traffic Noise Contributor | Minimum Setback Distance (m) | Proposed Mitigation Measures | Flats >70 dB(A) | |
|---|---|---|---|---|---|
| | | | | Unmitigated | Mitigated |
| ***Area 101 (PSPS) 2400 Flats*** | | | | | |
| A | Hoi On Road | 46 | Extended Podium (10 m closer to D1) Window Orientation | 40 | 0 |
| | Road D1 | 16 | | | |
| B - E | Hoi On Road | 85 | Nil | 0 | 0 |
| | Road L1 | 46 | | | |
| F | Road L1 | 12 | Window Orientation | 10 | 0 |
| ***Area 102 (PSPS) 2000 Flats*** | | | | | |
| A | Hoi On Road | 44 | Extended Podium (10 m closer 10 D1) Window Orientation | 90 | 30 |
| | Road D1 | 15 | | | |
| B,C | Hoi On Road | 93 | Window Orientation | 100 | 0 |
| | Tsuen Wan Road | 216 | | | |
| D - F | Hoi Hing Road | 18 | Window Orientation | 375 | 345 |
| | Tsuen Wan Road | 76 | | | |
| | Road D2 | 15 | | | |
| | Road D3 | 23 | | | |
| ***Area 103 (RI) 3000 Flats*** | | | | | |
| ALL | Road L1 | 18 | Nil | 0 | 0 |
| | Road L2 | 10 | | | |
| | Road D3 | 15 | | | |
| ***Area 104 (RS) 3600 Flats*** | | | | | |
| A | Hoi Hing Road | 8 | 5m tall boundary wall | 360 | 360 |
| | Tsuen Wan Road | 72 | | | |
| | Road D2 | 22 | | | |
| B | Road D2 | 22 | 3m tall boundary wall | 40 | 0 |
| | Road D3 | 50 | | | |
| | Road L2 | 6 | | | |
| | Roundabout | 10 | | | |
| C - E | Tsuen Wan Road | 134 | 3m tall boundary wall | 230 | 130 |
| | Road L2 | 8 | | | |

*Schools*

5.2.24 Two primary and two secondary schools of a standard Architectural Services

Department (ArchSD) design were proposed for the development. Sixteen representative noise sensitive receiver locations were selected for the purpose of noise assessment, and these are indicated in **Figures 5.2** and **5.4**.

5.2.25 Noise calculation based on the 2011 traffic flow data indicated that a few classroom facades would be exposed to exceedances of 65 dB(A) (**Table 5.15**). The maximum noise level of 68 dB(A) is predicted at the classroom facade (S12) overlooking Road L2 in area 103.

5.2.26 Mitigation measures would be necessary in order for the affected facades to meet the environmental criteria. Given the limited space availability on these sites, further setback from the roads would not be feasible. Similarly, reorientation would be limited to rotating the schools through 180 degrees. Since the affected schools are constrained by roads on one side and are shielded by residential high-rises on the other side, reorientation would expose more sensitive classroom facades to road noise, and thus worsen the noise impacts. This option is not considered any further.

**Table 5.15 Predicted Unmitigated Noise Levels at School Receivers**

| Receiver | Secondary (101) | | | Primary (103) | | | | Secondary (103) | | | Primary (104) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Floor | S1 | S2 | S3 | S5 | S6 | S7 | S8 | S9 | S11 | S12 | S13 | S14 | S15 | S16 |
| 1 | - | 60 | **66** | - | 61 | 64 | - | **66** | 62 | - | **67** | - | 61 | - |
| 2 | - | 61 | **66** | - | 62 | 65 | - | **66** | 62 | - | **67** | - | 62 | - |
| 3 | - | 61 | **66** | - | 62 | 65 | - | **67** | 63 | - | **67** | - | 62 | - |
| 4 | 55 | 61 | **66** | 57 | 63 | - | 64 | **67** | 64 | 62 | - | 65 | 63 | 55 |
| 5 | 62 | 61 | **66** | 64 | 64 | - | 64 | **67** | **66** | **67** | - | **66** | 64 | 63 |
| 6 | 64 | 61 | **66** | 65 | 65 | - | 64 | **67** | **66** | **68** | - | **66** | 65 | 64 |

Notes: Exceedances of the HKPSG recommended maximum noise level of 65 dB(A) are bolded and shaded.

5.2.27 The potential screening effects of a 3m high boundary wall located along the site boundary adjacent to the affected school facades were assessed. The extent of the boundary wall is shown in **Figures 5.2 and 5.4**, and the predicted noise levels are given in **Table 5.16**.

5.2.28 The proposed 3m tall boundary walls are found to be sufficient to overcome the predicted non-compliance except at the upper floor facades of the secondary school in area 103. At this particular location, a barrier of 7m height along the northbound lanes of Road L1 and Road L2 would be required to resolve the slight exceedance of the HKPSG noise standard. Since a roadside barrier of such height is not feasible along local roads, indirect remedies should be considered for the affected upper floor facades.

**Table 5.16 Predicted Noise Levels at School Receivers (with 3m tall boundary walls as shown in Figures 5.2 and 5.4)**

| Floor | Noise Sensitive Receiver | | | | | |
|---|---|---|---|---|---|---|
| | S3 | S9 | S11 | S12 | S13 | S14 |
| 1 | 62 | 62 | 53 | - | 62 | - |
| 2 | 63 | 63 | 54 | - | 63 | - |
| 3 | 63 | 63 | 56 | - | 63 | - |
| 4 | 64 | 65 | 60 | 62 | - | 62 |
| 5 | 64 | 65 | 64 | **67** | - | 63 |
| 6 | 64 | **66** | **66** | **67** | - | 64 |

Notes: 1 Exceedances of the HKPSG recommended maximum noise level of 65 dB(A) are bolded and shaded.

*Existing Noise Sensitive Receivers*

5.2.29 For existing dwellings in Bayview Garden and Belvedere Garden Phase 3, the predicted unmitigated noise levels based on 2011 traffic flows show that facades within 20 m from the road-edge of Hoi On Road may be exposed to levels of 70 dB(A) or higher. The maximum noise levels are predicted to be 76 dB(A) and 74 dB(A) for NSRs in Bayview Garden and Belvedere Garden Phase 3 respectively. Calculation results for individual receivers are given in **Appendix A2**.

5.2.30 It is estimated that approximately 10% or 220 dwellings in Belvedere Garden Phase 3 would potentially experience exceedances of the HKPSG noise standards. However, all of the affected facades would benefit from the proposed tunnel such that the noise contribution from new roads does not exceed 1.0 dB(A). As a result, further provision of noise mitigation measures on the new road would not be effective and none of the 220 units would meet the eligibility criteria for indirect technical remedies under the relevant ExCo Directive.

5.2.31 For existing sensitive receivers in Bayview Garden, approximately 17% or 230 units are predicted with unmitigated noise levels in excess of the HKPSG noise standard of 70 dB(A). Most of these facades would be affected by noise contribution exceeding 1.0 dB(A) from new roads. In order to reduce the overall traffic noise to meet the HKPSG noise standard as far as practicable, canopy type barriers (5m tall + 2m overhang) on the new roads southwest of the proposed tunnel (**Figure 5.5**) are recommended. With the provision of the canopy type barrier, only about 80 units are predicted to have noise levels above the HKPSG standard. However, as the dominant noise source would be from existing roads, none of the dwellings would meet the eligibility criteria for indirect technical remedies.

5.2.32 The unmitigated noise levels at the existing facades facing Tsuen Wan Road in Clague Garden Estate are predicted with noise levels above the HKPSG standard of 70 dB(A) in 2011 (**Appendix A2**). The unmitigated scenario represents a scheme with no noise mitigation apart from the standard 0.5 m parapets on the elevated Tsuen Wan Road. The maximum noise level of 84 dB(A) has been predicted for the school facades at Salvation Army Ng Kwok Wai Memorial Kindergarten adjacent to Tsuen Wan Road. All of these receivers, under this unmitigated situation, would be subject to significant noise contribution from new roads.

5.2.33 The provision of 5m tall noise barriers on the new ramp (**Figure 5.6**) connecting the tunnel and Tsuen Wan Road has been considered to mitigate noise impacts on nearby facades in Clague Garden Estate. If the noise barrier is 5m tall with a 3m overhang, the noise contribution from the new ramp is significantly reduced, and would be less than 1.0 dB(A). None of the dwellings would meet the eligibility criteria for indirect technical remedies.

5.2.34 Although the proposed mitigation measures on the new ramp would greatly reduce the overall traffic noise level affecting Clague Garden Estate, the predicted overall reduction of noise levels by 2 to 4 dB(A) is still insufficient to meet the HKPSG standard. The high level of traffic on the existing Tsuen Wan Road is still the dominant source of traffic noise on nearby facades in Clague Garden Estate and those on the new residential development in site 104. As the existing Tsuen Wan Road is not to be upgraded in this study, it is not the current practice to provide noise mitigations for the existing road. Nevertheless, direct mitigation measures on Tsuen Wan Road would be more effective in resolving the potential noise problems, and thus should be considered in any future study that aims to upgrade Tsuen Wan Road.

5.2.35 The proposed mitigation measures on new roads and within the development sites are shown in **Figure 5.7**. Similarly, those facades with predicted noise levels above the HKPSG in the new development sites are also highlighted in this figure. Typical sections of the proposed canopy type noise barriers are shown in **Figures 5.8a -5.8b**. Detailed design of the noise barriers will be considered during the detailed design stage. Access would be provided for the maintenance of these canopy type barriers.

*Noise due to the ventilation shaft of the trunk road bypass tunnel*

5.2.36 To ensure that traffic emissions are adequately dispersed, a ventilation shaft has been proposed which would be considered as a noise source. The closest NSRs to this ventilation shaft were identified as the residential towers in Area 102 of the proposed development which were at least 100 m away from the ventilation shaft. Noise from portals and vents have been considered using the guidance provided within the *Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites*. Acceptable Noise Levels (ANLs) were defined within this TM but it has been decided that the design process should aim for 5 dB (A) less than the appropriate ANLs (as indicated in **Table 3.2** of this report).

5.2.37 The maximum permissible noise level at the ventilation shaft was calculated through extrapolation by standard acoustic principles. Calculation results indicated that the noise level at the ventilation shaft should not exceed 100 dB(A) in order to meet the noise standards at the closest NSRs. Noise impact from the ventilation shaft should be controlled through proper design of the ventilation system during the detailed design stage of the project to ensure that the noise generated from the ventilation shaft is below the level of 100 dB(A).

### 5.3 Industrial Noise

*Assessment Results*

5.3.1 Results of industrial noise measurements are shown in **Table 5.17**. Noise monitoring points were shown in **Figure 5.9**. Estimated industrial noise levels experienced by the future noise sensitive receivers are given in **Table 5.18**. The noise sensitive receivers and their positions are selected based on the master layout plan.

5.3.2 Direct facing facades of the easternmost blocks of the PSPS in Area 102A and the RS in Area 104A would be sensitive to the industrial area north of Hoi Shing Road. Based on the projection of noise measurement results, the estimated industrial noise levels experienced by these facades were around 60 and 54 dB(A) respectively for the daytime and evening, while nighttime noise might reach 55 dB(A). All industrial noise levels would meet the criteria indicated in Section 3.4.2 and **Table 3.2**.

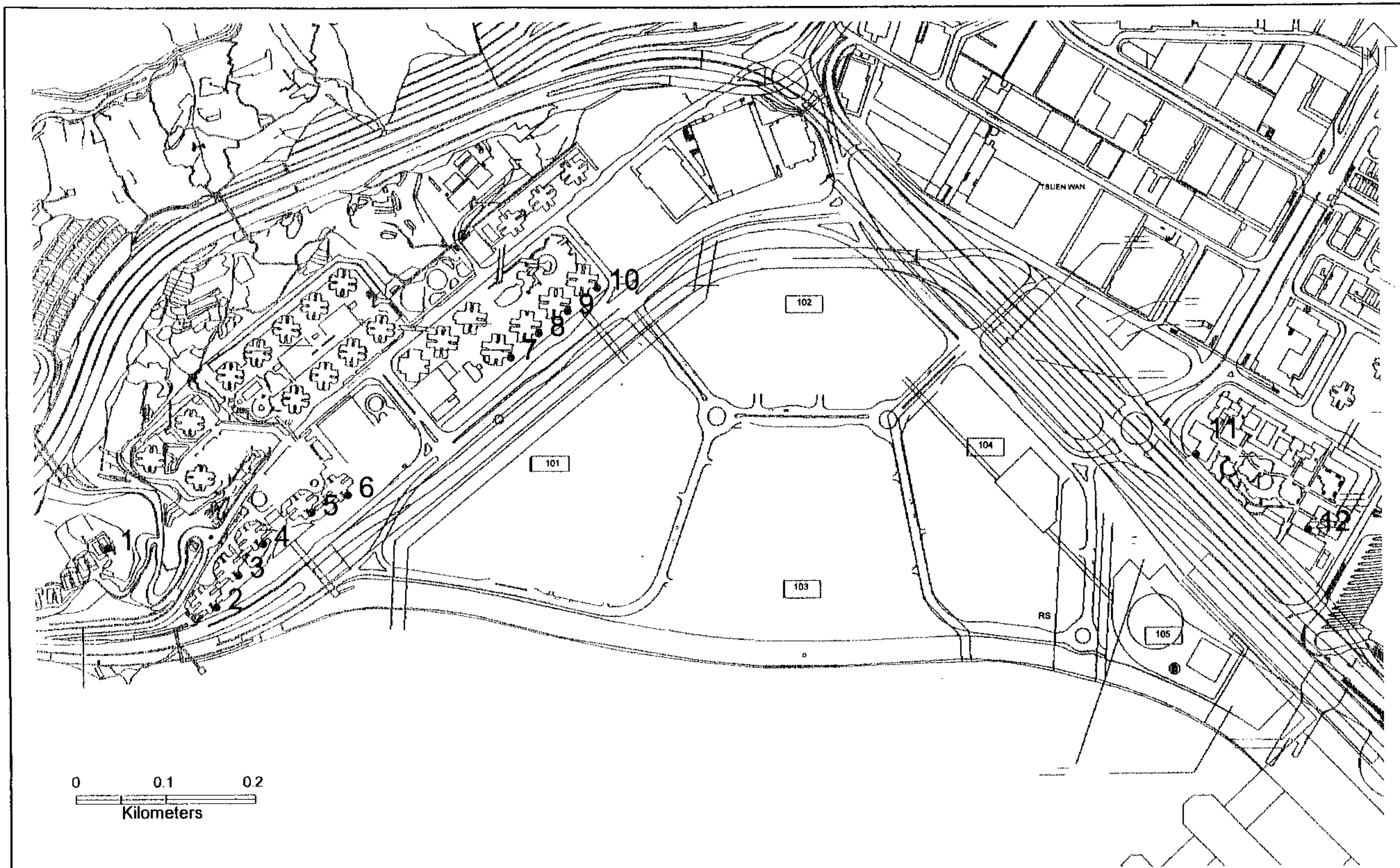
**Table 5.17 Industrial Noise Measurement Results**

| Time Period | Measured Noise Level dB(A) | |
|---|---|---|
| | Location 1 | |
| | 27/5/97 | 28/5/97 |
| Daytime (0700 to 1900 hrs)* | 77.7<br>75.6 | 76.1<br>75.3 |
| Evening (1900 to 2300 hrs) | 70.1 | 71.3 |
| Night (2300 to 0700 hrs) | 70.7 | 71.8 |

Note *: Two sets of data were obtained during daytime on both monitoring days

**Table 5.18 Results of Noise Estimation Contributed by the Industrial Area North of Ho Shing Road**

| Sensitive Receiver | Distance | Time Period | Estimated Noise Level | ANL - 5 db(A) |
|---|---|---|---|---|
| PSPS Area 102A the Easternmost Block Facade Facing the Industrial Area | 170 m | Daytime (0700 to 1900 hrs) | 60 | 65 |
| | | Evening (1900 to 2300 hrs) | 54 | 65 |
| | | Night (2300 to 0700 hrs) | 55 | 55 |
| RS Area 104A the Easternmost Block Facade Facing the Industrial Area | 175 m | Daytime (0700 to 1900 hrs) | 60 | 65 |
| | | Evening (1900 to 2300 hrs) | 54 | 65 |
| | | Night (2300 to 0700 hrs) | 55 | 55 |




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

LOCATION OF CONSTRUCTION NOISE SENSITIVE RECEIVERS FOR CONSTRUCTION NOISE ASSESSMENT

| | |
|---|---|
| FIGURE | 5.1 |
| SCALE | 1 : 6000 |

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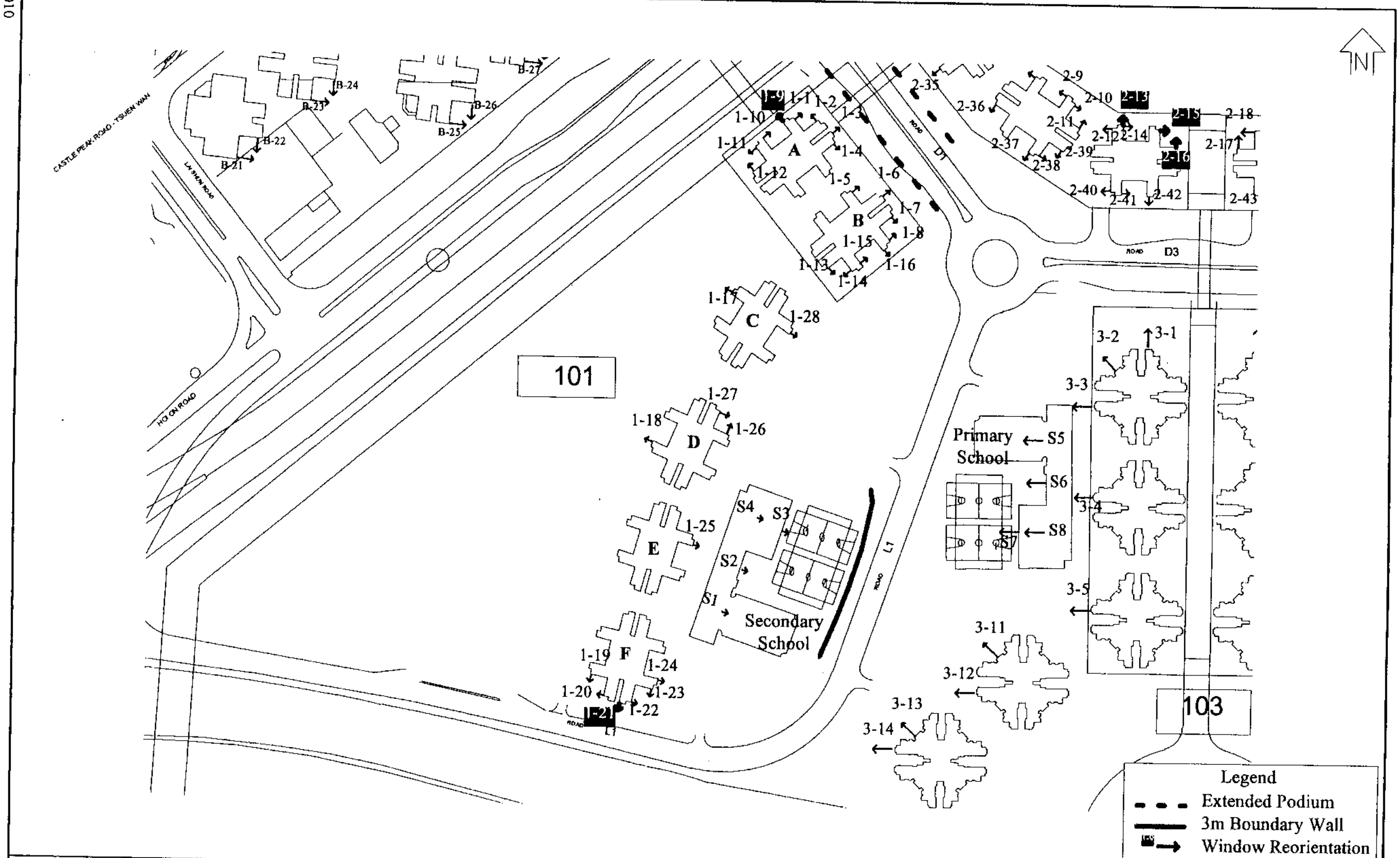
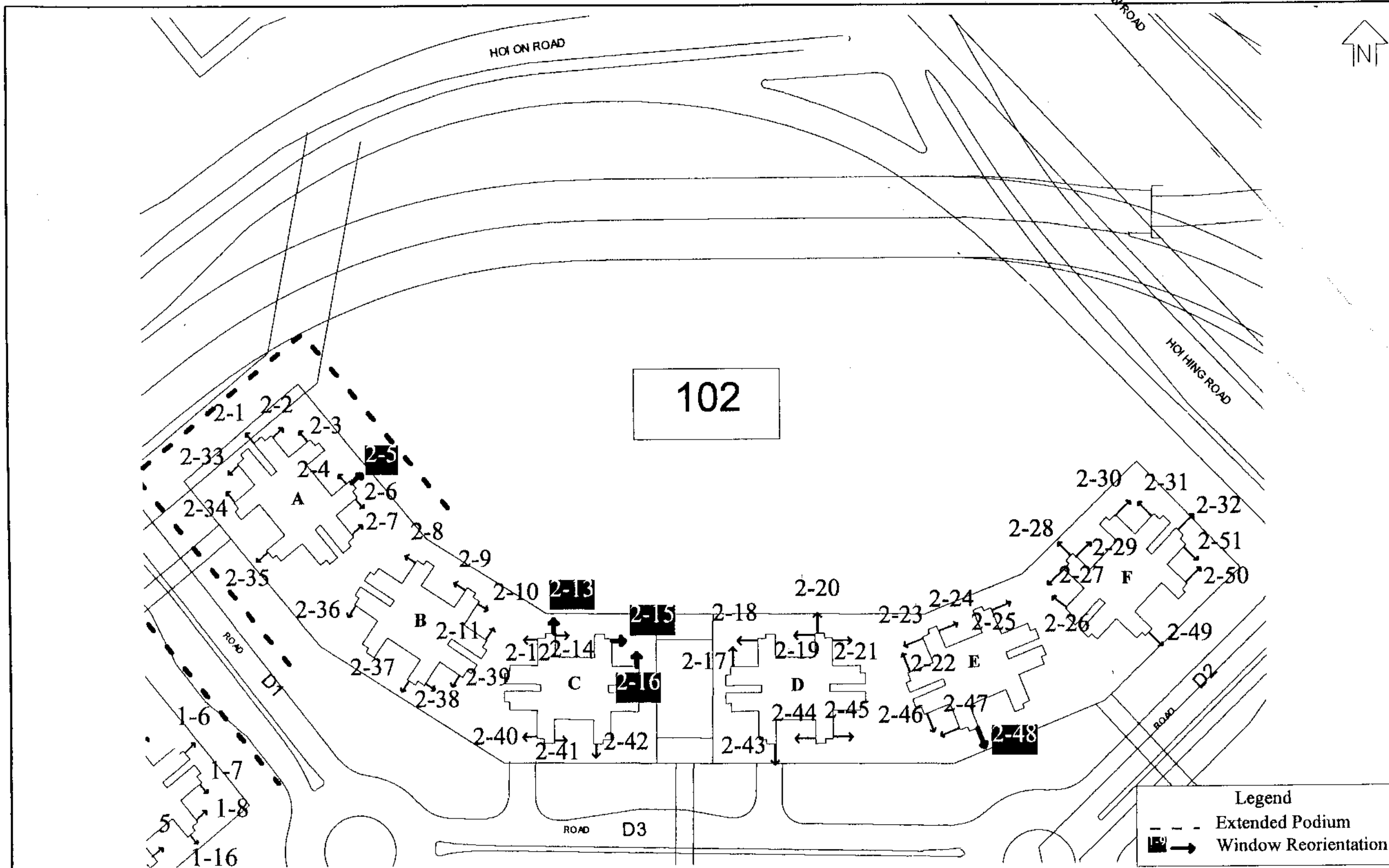



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
NOISE SENSITIVE RECEIVERS IN AREA 101
AND 103 FOR TRAFFIC NOISE ASSESSMENT

| | |
|---|---|
| FIGURE | 5.2 |
| SCALE | 1 : 2300 |



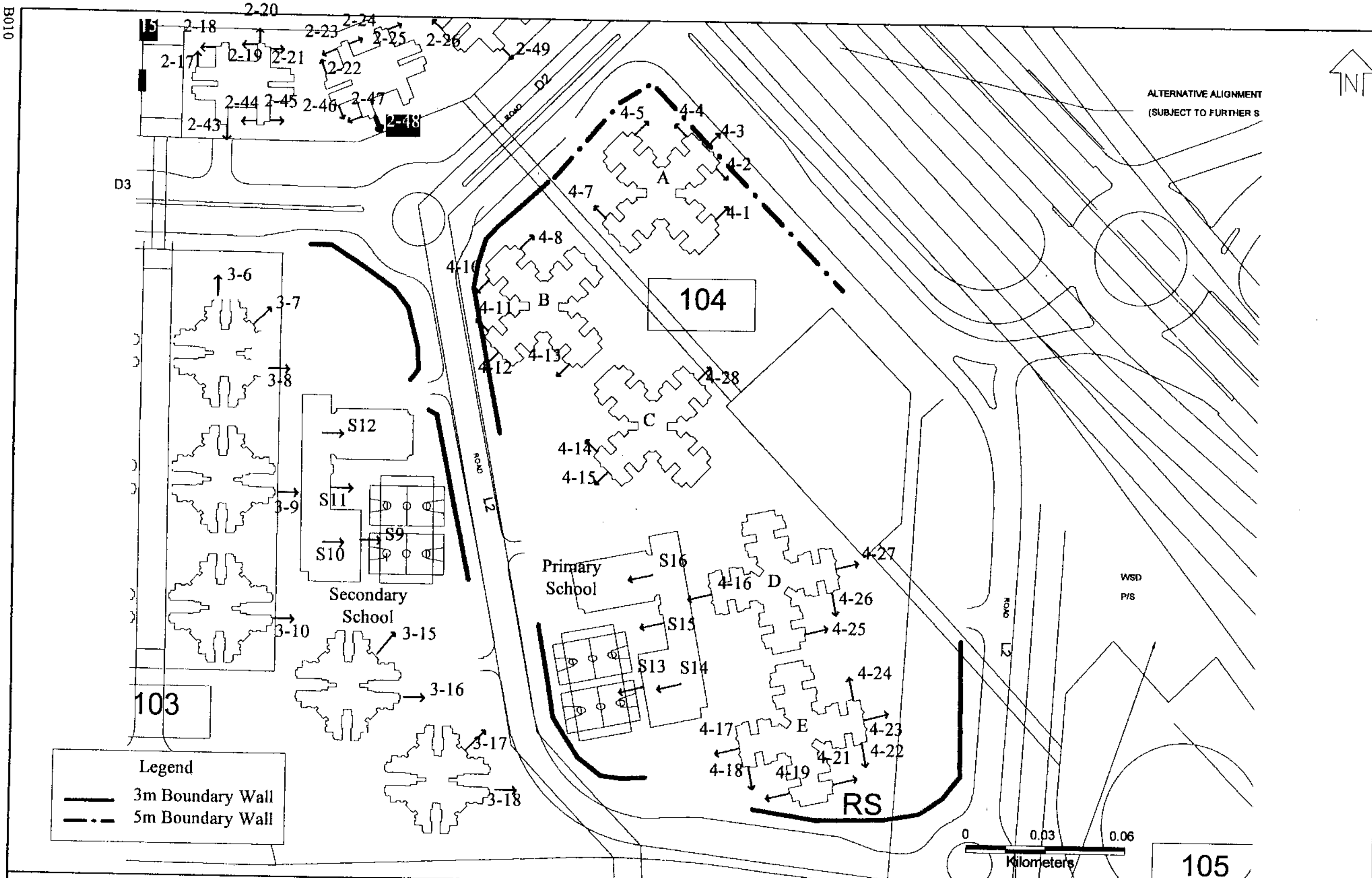

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

NOISE SENSITIVE RECEIVERS IN AREA 102
FOR TRAFFIC NOISE ASSESSMENT

FIGURE 5.3

SCALE 1 : 1500

B010

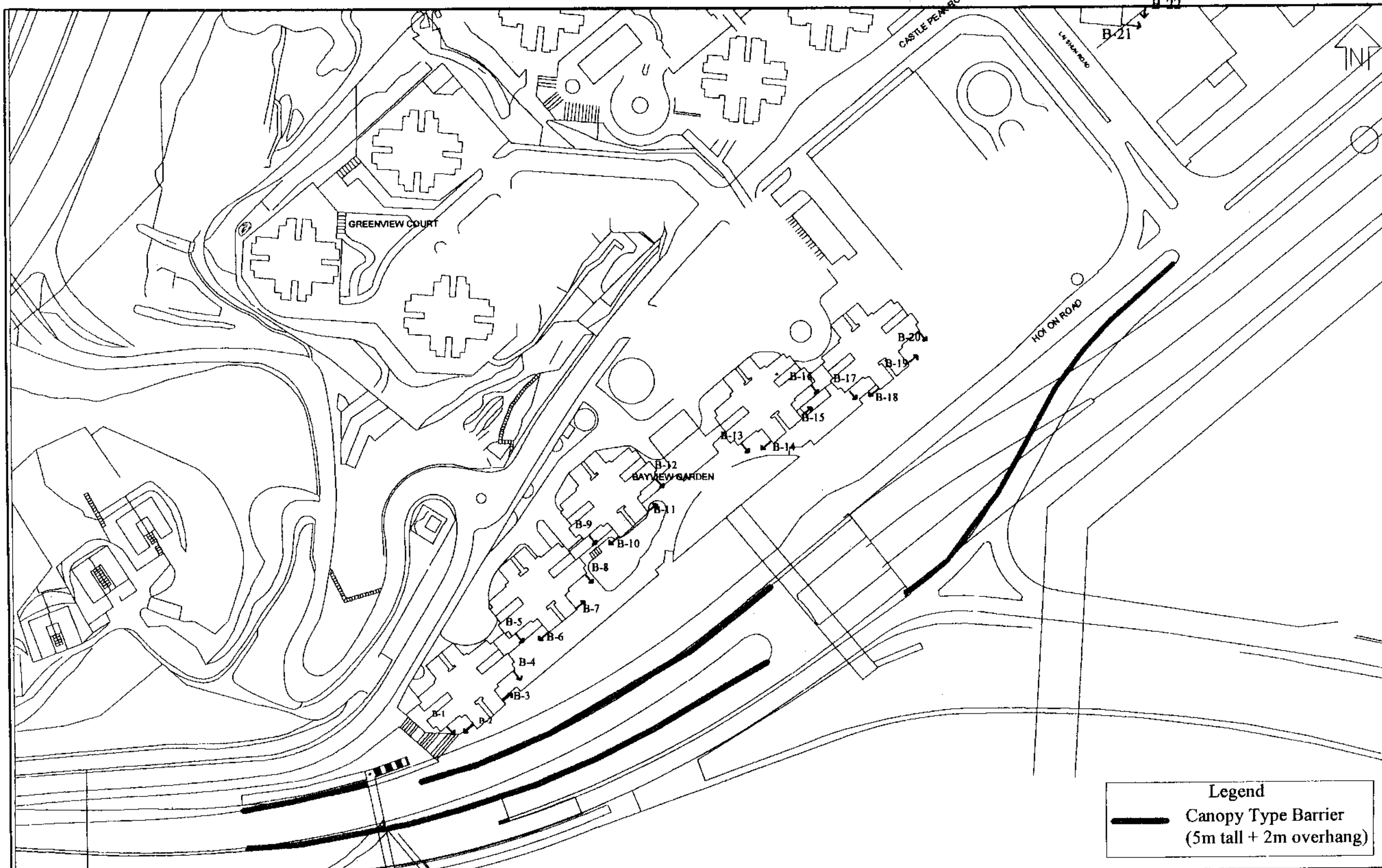



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

NOISE SENSITIVE RECEIVERS IN AREAS 103 AND 104 FOR TRAFFIC NOISE ASSESSMENT

| | |
|---|---|
| FIGURE | 5.4 |
| SCALE | 1 : 2000 |

B010

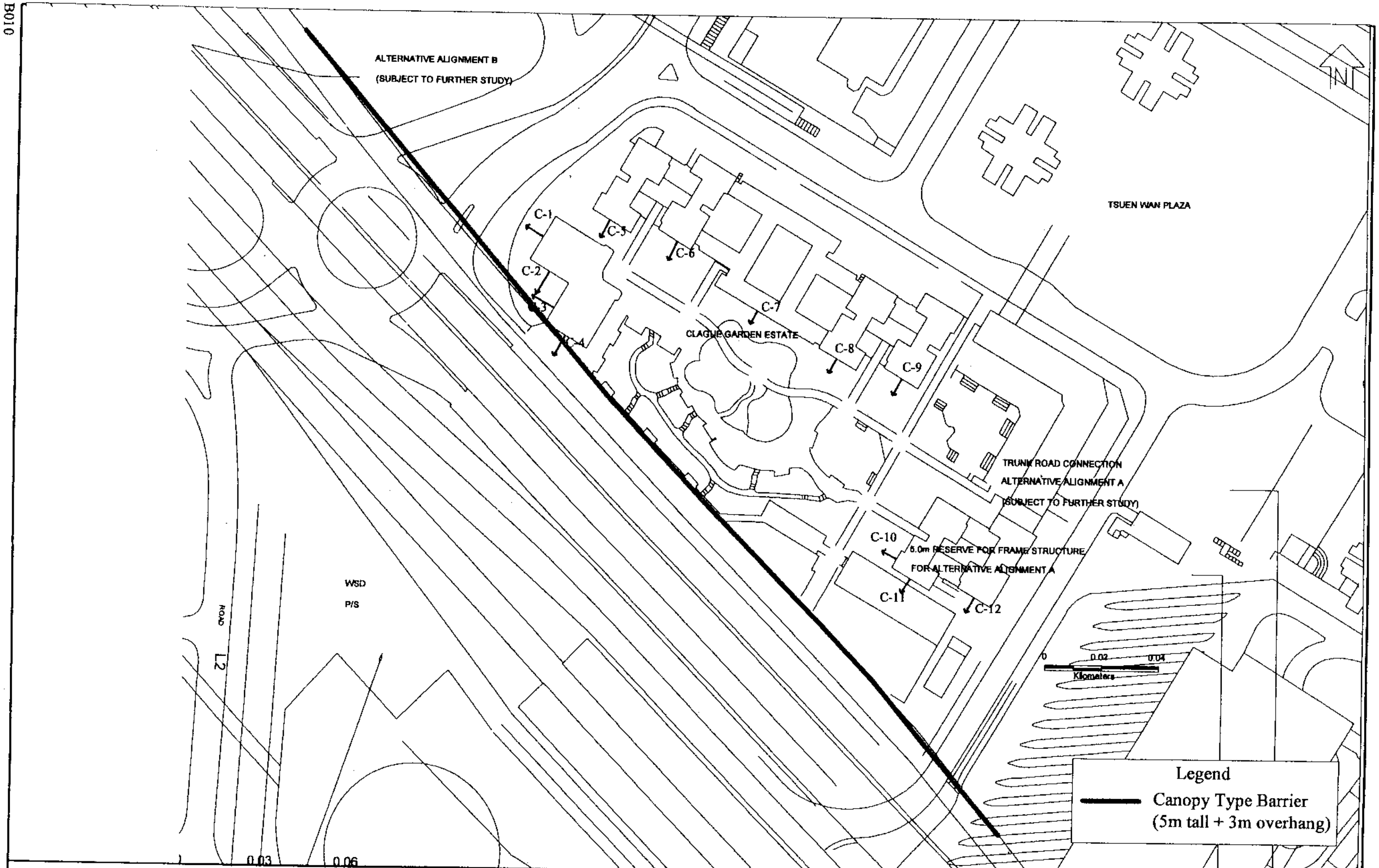



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
THE LOCATION OF PROPOSED NOISE BARRIERS
FOR BAYVIEW GARDEN

FIGURE 5.5

SCALE 1 : 4500

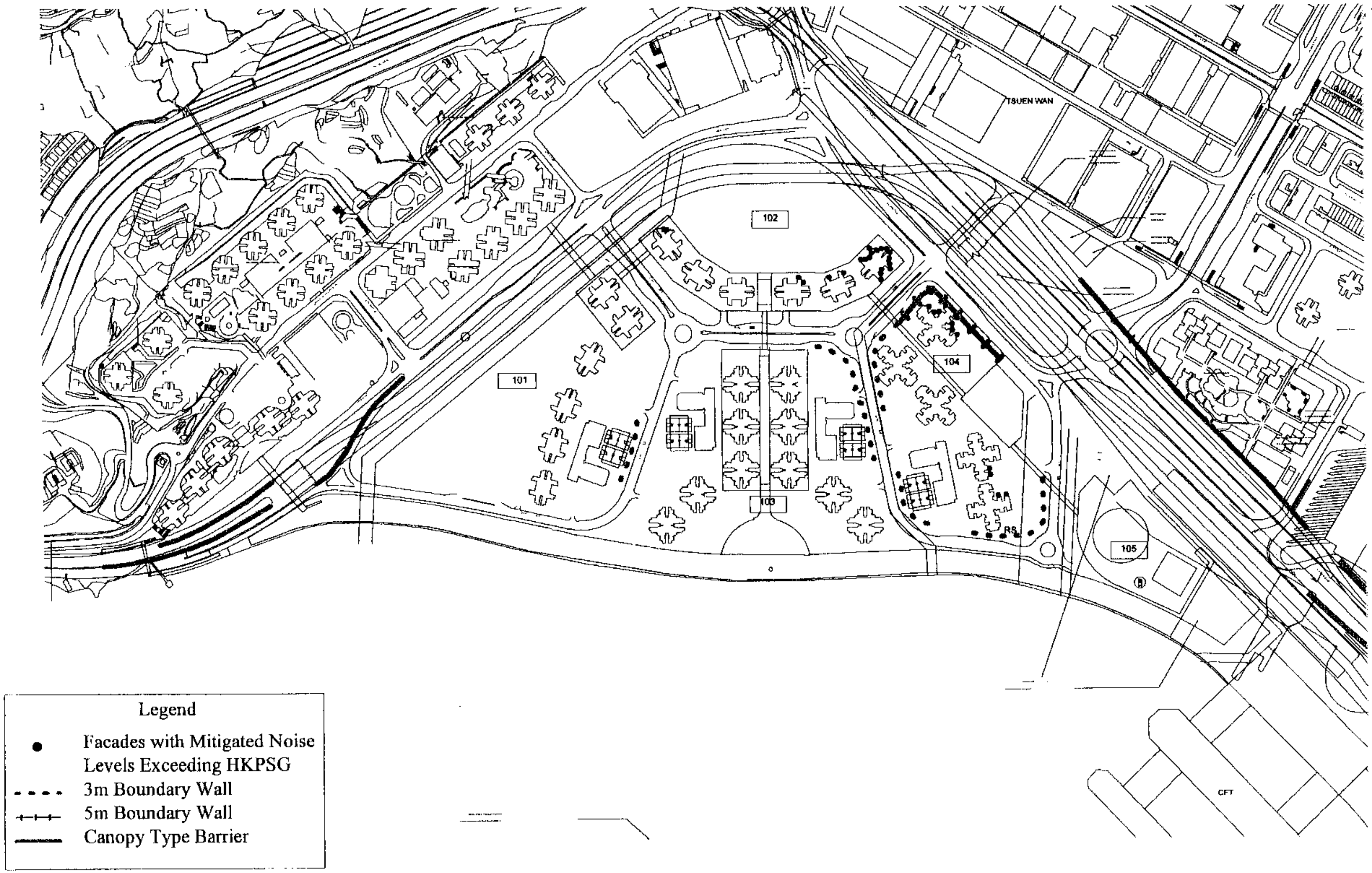
B010




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
THE LOCATION OF PROPOSED NOISE BARRIERS
FOR GLAGUE GARDEN ESTATE

FIGURE 5.6

SCALE 1 : 4500




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
PROPOSED MITIGATION MEASURES AND FACADES WITH MITIGATED NOISE LEVELS EXCEEDING HKPSG

| | |
|---|---|
| FIGURE | 5.7 |
| SCALE | 1 : 6250 |

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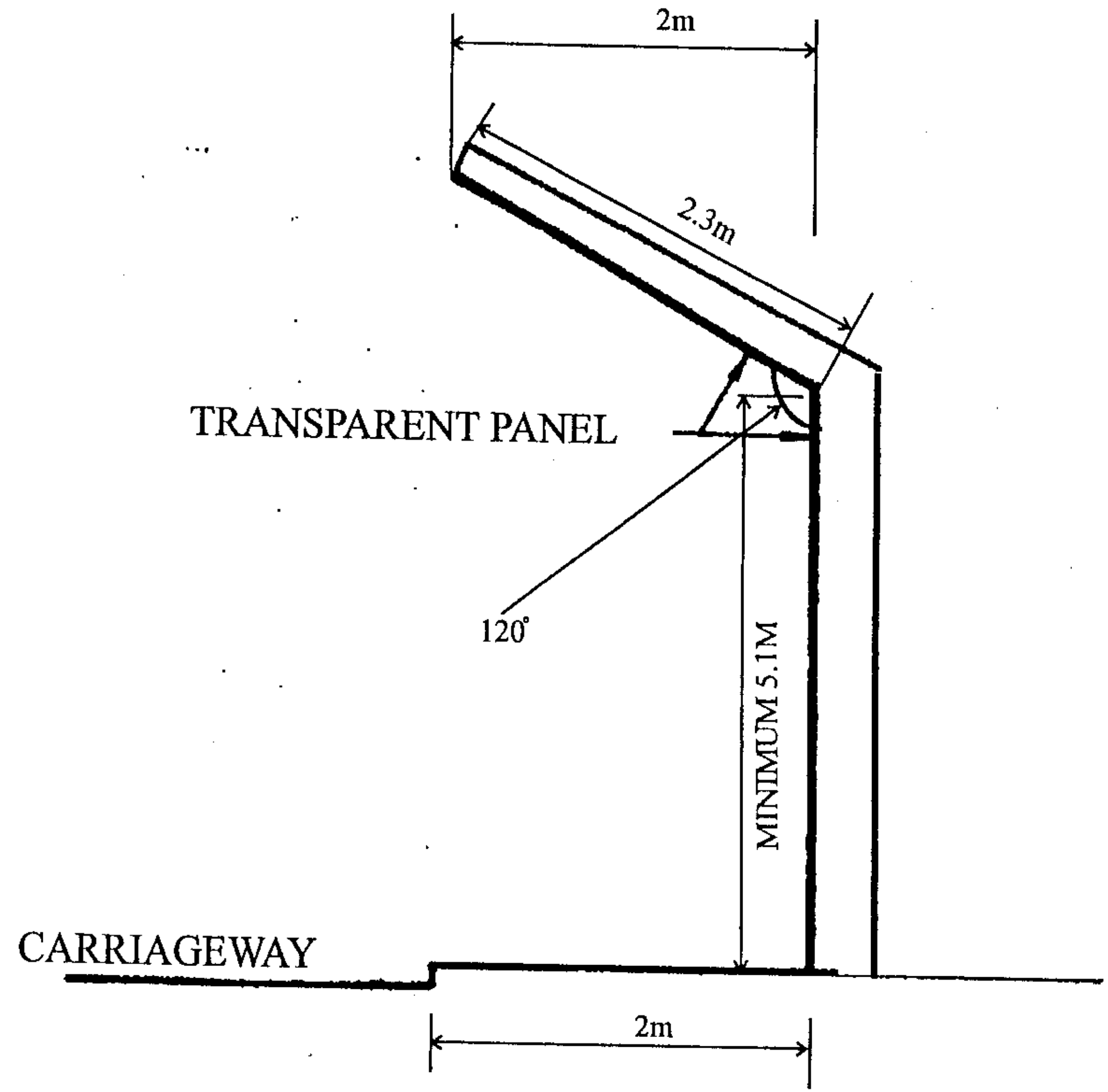
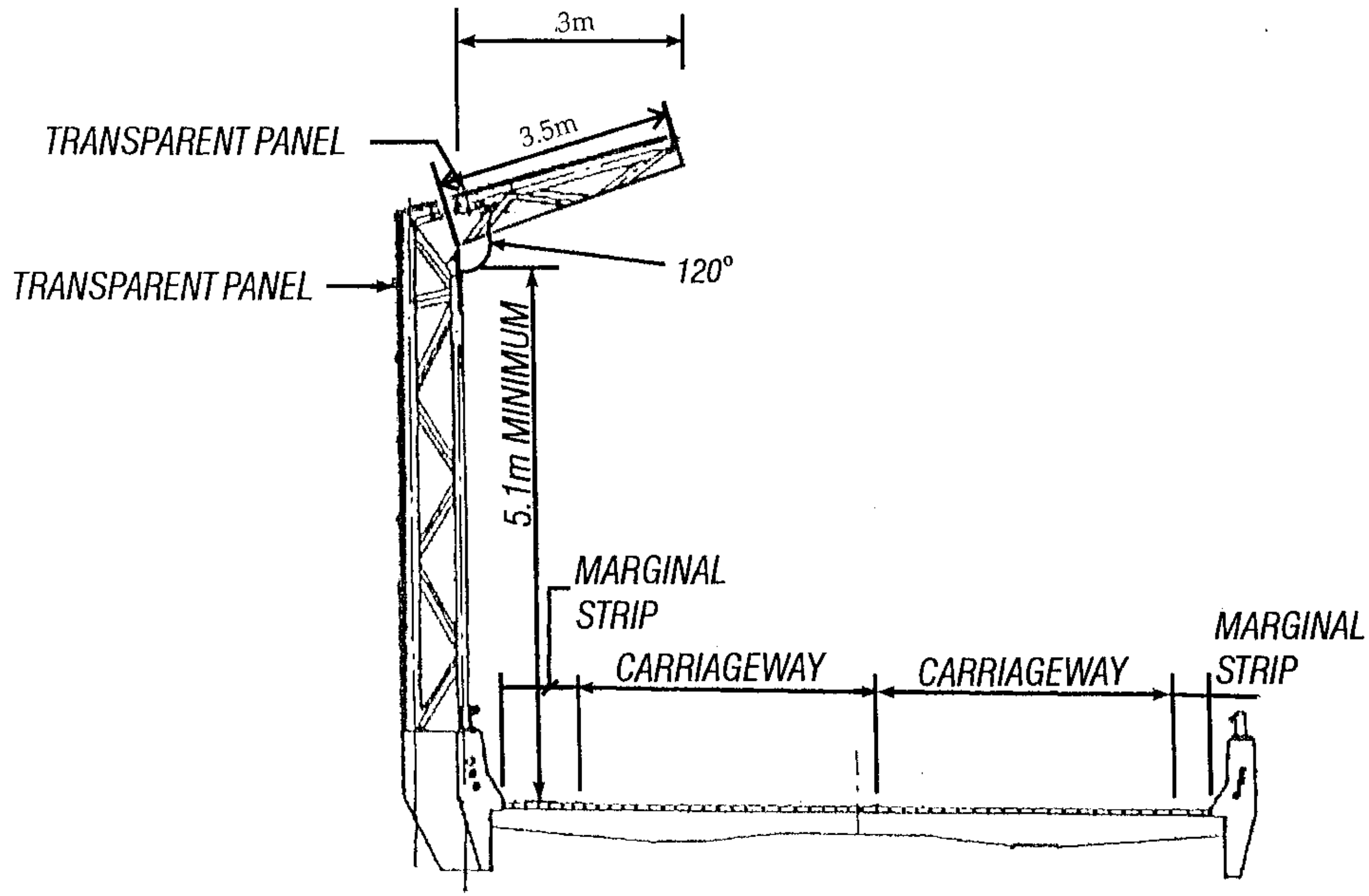



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

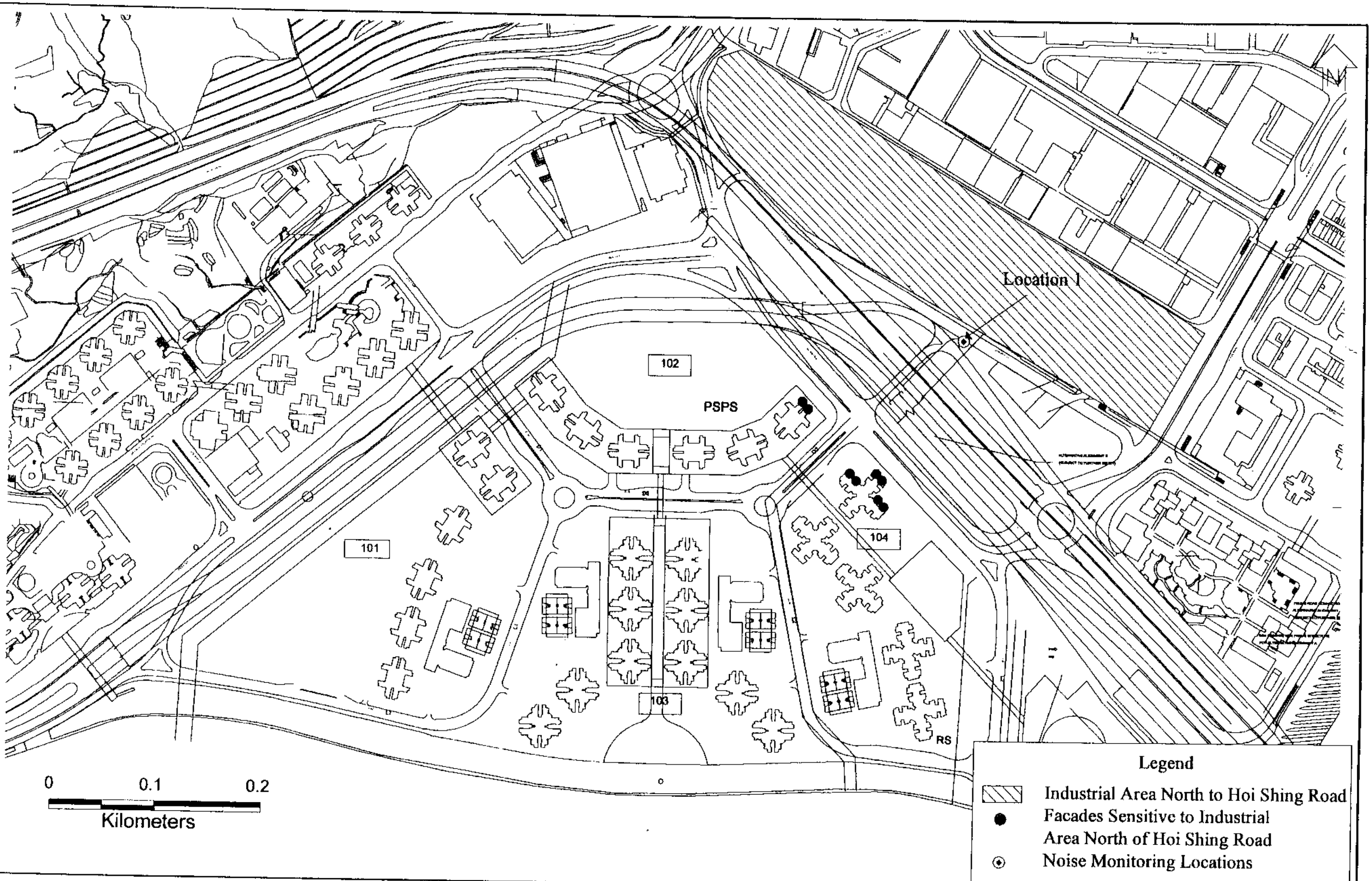
TYPICALSECTION OF NOISE CANOPY ON GROUND

(NEW ROADS IN THE SOUTHWEST TO THE PROPOSED TUNNEL)

| | |
|---|---|
| FIGURE | 5.8a |
| SCALE | NOT TO SCALE |




| | |
|---|---|
| TSUEN WAN BAY FURTHER RECLAMATION, AREA35<br>TYPICALSECTION OF NOISE CANOPY<br>(NEW RAMP CONNECTING THE PROPOSED TUNNELAND TSUEN WAN ROAD) | FIGURE 5.8b<br>SCALE NOT TO SCALE |




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

INDUSTRIAL NOISE SOURCES AND SENSITIVE RECEIVERS FOR INDUSTRIAL NOISE ASSESSMENT

| | |
|---|---|
| FIGURE | 5.9 |
| SCALE | 1 : 5000 |

B010

# 6 AIR QUALITY ASSESSMENT

## 6.1 Construction Phase Impacts

*Construction Dust*

6.1.1 The predicted maximum 1-hour average and maximum 24-hour average TSP concentrations at the representative ASRs are tabulated in **Table 6.1**. The dispersion modelling was undertaken based on the meteorological data of Ching Pak House (Tsing Yi) station for year 1994. A background TSP concentration of 90 $\mu gm^{-3}$ was incorporated in all the calculations to predicted the cumulative dust impacts at the representative ASRs.

6.1.2 Modelling was undertaken for two scenarios namely:

- No dust mitigation; and
- 50 percent dust reduction by twice daily watering with complete coverage of active working areas.

6.1.3 As shown in **Table 6.1**, the modelling results showed that with no dust mitigation, the 1-hour average TSP guideline level of 500 $\mu gm^{-3}$ will be exceeded at all the representative ASRs but there will be no exceedance of the 24-hour average AQO for TSP. With 50% dust reduction, exceedance of the 1-hour average guideline level and 24-hour average AQO for TSP at the air sensitive receivers will not be expected. The predicted 1-hour average TSP concentration contour plots for the two scenarios are shown in **Figures 6.1 and 6.2**.

**Table 6.1 Predicted Maximum 1-hour and 24-hour Average TSP Concentrations at the Representative ASRs**

| ASR | No Dust Mitigation | | 50% Dust Reduction | |
|---|---|---|---|---|
| | Max. 1-hour average TSP ($\mu gm^{-3}$) | Max. 24-hour average TSP ($\mu gm^{-3}$) | Max. 1-hour average TSP ($\mu gm^{-3}$) | Max. 24-hour average TSP ($\mu gm^{-3}$) |
| A1 | 688 * | 130 | 389 | 110 |
| A2 | 728 * | 136 | 409 | 113 |
| A3 | 768 * | 138 | 429 | 114 |
| A4 | 894 * | 159 | 492 | 124 |
| A5 | 758 * | 182 | 424 | 136 |
| A6 | 625 * | 167 | 357 | 129 |
| A7 | 669 * | 174 | 380 | 132 |
| A8 | 854 * | 195 | 472 | 142 |
| A9 | 809 * | 221 | 450 | 156 |
| A10 | 752 * | 220 | 421 | 155 |
| A11 | 804 * | 215 | 447 | 153 |
| A43 | 718 * | 213 | 404 | 151 |
| A44 | 668 * | 204 | 379 | 147 |
| A45 | 586 * | 175 | 338 | 133 |
| A46 | 560 * | 150 | 325 | 120 |
| A47 | 657 * | 166 | 374 | 128 |

Note: * Exceedance of the 1-hour average TSP guideline level of 500 $\mu gm^{-3}$.

*Odour From Dredging*

6.1.4 There would be potential emission of odorous gas during the marine mud dredging operations in the construction phase of the project. It is noted that the proposed construction methods would require a minimal amount of dredging. Dredging of marine mud will only be required for the construction of seawall foundation during Phase I of the reclamation. Exposure of the dredged materials before dumping back to the site would probably cause temporary odour nuisances to nearby sensitive receivers. Nevertheless, since all the dredged materials will be dumped within the site, odour emissions from stockpiling and transportation of the dredged materials will be minimized.

6.1.5 According to the schedule of reclamation works, dredging will be carried out in a period of five months. Odour impacts from dredging will thus be temporary. In addition, the distance between existing sensitive receivers and the site is more than 100 m, with proper controls and mitigation measures, potential odour impacts at nearby sensitive receivers would not be significant.

## 6.2 Operational Phase Impacts

*Traffic Emissions*

6.2.1 Tunnel alignment and location of the proposed ventilation shaft is shown in **Figure 6.3**. Predicted worst-case 1-hour average $NO_2$ concentrations at the representative ASRs are given in **Table B4.1** of **Appendix B4**. The predicted worst-case 1-hour average $NO_2$ concentration contours at 1.5 m and 30 m above ground are shown in **Figures 6.4 and 6.5** respectively to represent the impacts due to ground level traffic emissions and tunnel ventilation shaft emissions.

6.2.2 The modelling results showed that there will be no exceedance of the AQO for $NO_2$ at the representative ASRs. The predicted worst-case 1-hour average $NO_2$ concentrations at most of the representative ASRs are well below the AQO. The highest worst case 1-hour average $NO_2$ concentration of 274 $\mu gm^{-3}$ and 192 $\mu gm^{-3}$ (91% and 64% of AQO respectively) were predicted at ASRs A47 and A19 at 1.5 m above ground for existing and future ASR respectively.

6.2.3 It is predicted that the $NO_2$ concentrations are highest at the north-east of the site. This is probably due to the high forecasted traffic flow along Tsuen Wan Road, Hoi Hing Road and the connected ramps.

6.2.4 The modelling results indicate that the portal emissions will not adversely affect the ASRs provided that the tunnel ventilation system can discharge up to 70% of the traffic emission of the tunnel into the atmosphere through the ventilation shaft. The assessment showed that the emissions from the ventilation shaft would have a higher impact on the upper levels. The minimum buffer distance is around 30 m if it is assumed that 100% of the traffic emission of the tunnel is discharged through the ventilation shaft. The predicted maximum $NO_2$ concentration at a distance of 30 m away from the ventilation shaft is about 260 µgm$^{-3}$. To minimise the air quality impact, it is suggested a buffer distance of 100 m which is about the maximum separation between the ASRs and the ventilation shaft.

*Stack Emissions*

6.2.5 In order to give a detailed assessment, the $SO_2$ concentrations at different heights above ground level were calculated. The contour showing the maximum 1-hour average $SO_2$ concentrations at the worst affected level (130 m above ground) is shown in **Figure 6.6**. According to the modelling results, exceedances of the AQO would occur at heights from 90 m to 130 m above ground. The results suggested that exceedances of the AQO would be attributed to the stack emissions at the north of the site. **Figure 6.7** shows the extent of the height restriction zone. The height of future devleopments (i.e. the open space Area 102B) located within the height restriction zone are all below 90m and therefore the $SO_2$ concentrations at all ASRs will comply with the AQO.

6.2.6 The predicted maximum 1-hour, maximum 24-hour and annual average $SO_2$ concentrations at the representative ASRs based on 1993 meteorological data are shown in **Tables B4.2, B4.3 and B4.4** respectively in **Appendix B4**. The modelling results indicated that the maximum 1-hour average $SO_2$ concentrations at all the ASRs will comply with the AQO. The highest maximum 1-hour average $SO_2$ concentration of 745 µgm$^{-3}$ is predicted at A19. As the impacts were came from the higher stacks from nearby industrial buildings, the predicted $SO_2$ concentrations at higher floors (25th to 37th floors) are relatively greater.

6.2.7 The modelling results showed that there would be no exceedances of the 24-hour average AQO for $SO_2$ at any of the representative ASRs. The worst affected ASRs are located at the northern portion of the site. The highest predicted maximum 24-hour average $SO_2$ concentration is 108 µgm$^{-3}$.

6.2.8 The predicted annual average concentrations at all the ASRs are well within the AQO. The highest predicted annual average $SO_2$ concentration is 18 µgm$^{-3}$.

## 6.3 Mitigation Proposals

6.3.1 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 an environmental monitoring and auditing program to monitor the construction process in order to enforce controls and modify methods of work if dusty conditions arise.

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

6.3.3 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

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

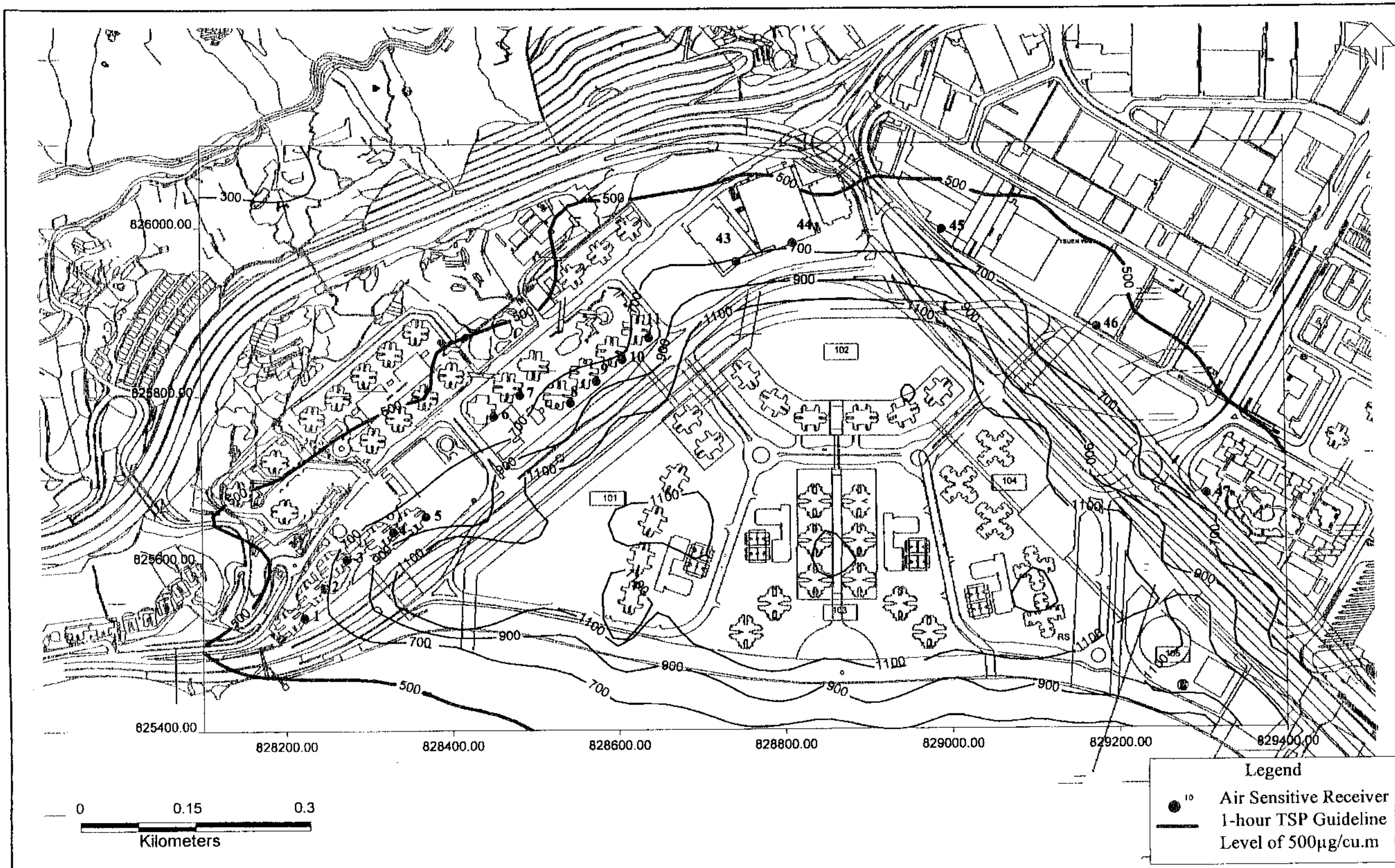
- Open stockpiles of the excavated material should be avoided or covered. Where possible, prevent odorous stockpiles near air quality sensitive receivers.

- 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.

6.3.5 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.

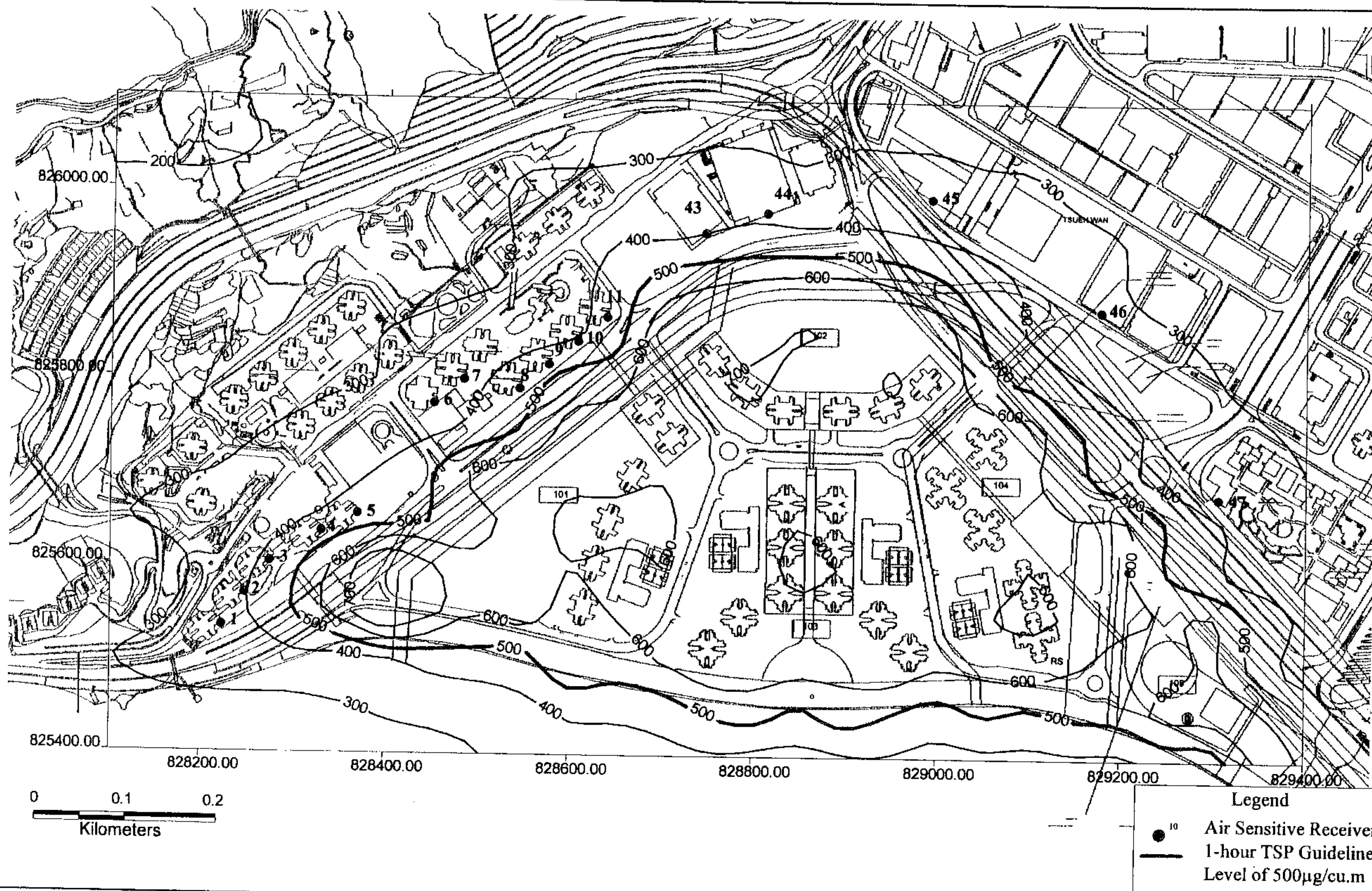
- By injecting a solution of iron salts (or any other product able to eliminate production of hydrogen sulphide) into the closed pipeline, emission of hydrogen sulphide from the outlet of the pipeline will be reduced.




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

PREDICTED MAXIMUM 1-HOUR AVERAGE TSP CONCENTRATION
AT 1.5M ABOVE GROUND (WITHOUT DUST MITIGATION) (unit μg/cu.m)

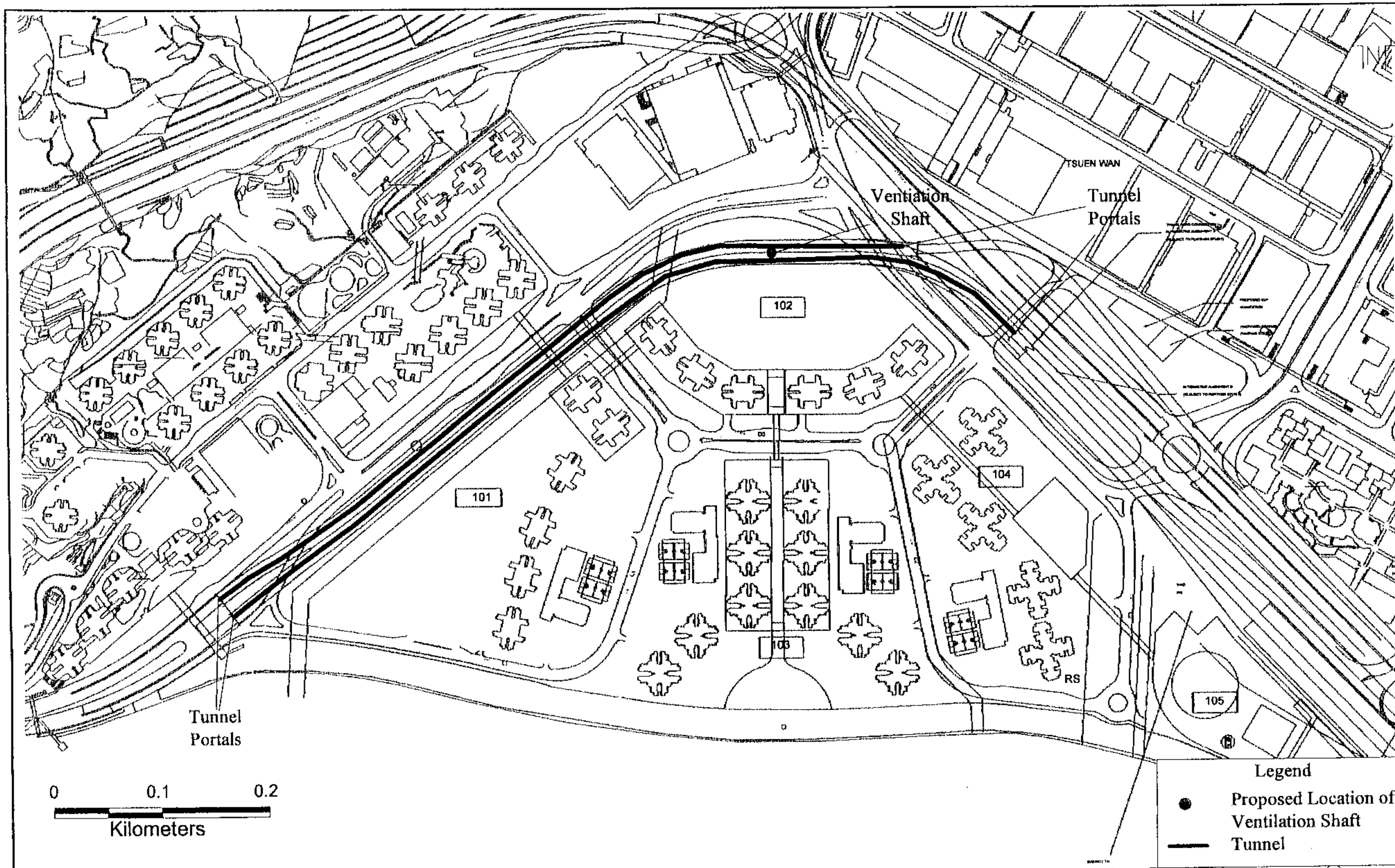
| | |
|---|---|
| FIGURE | 6.1 |
| SCALE | 1 : 6500 |



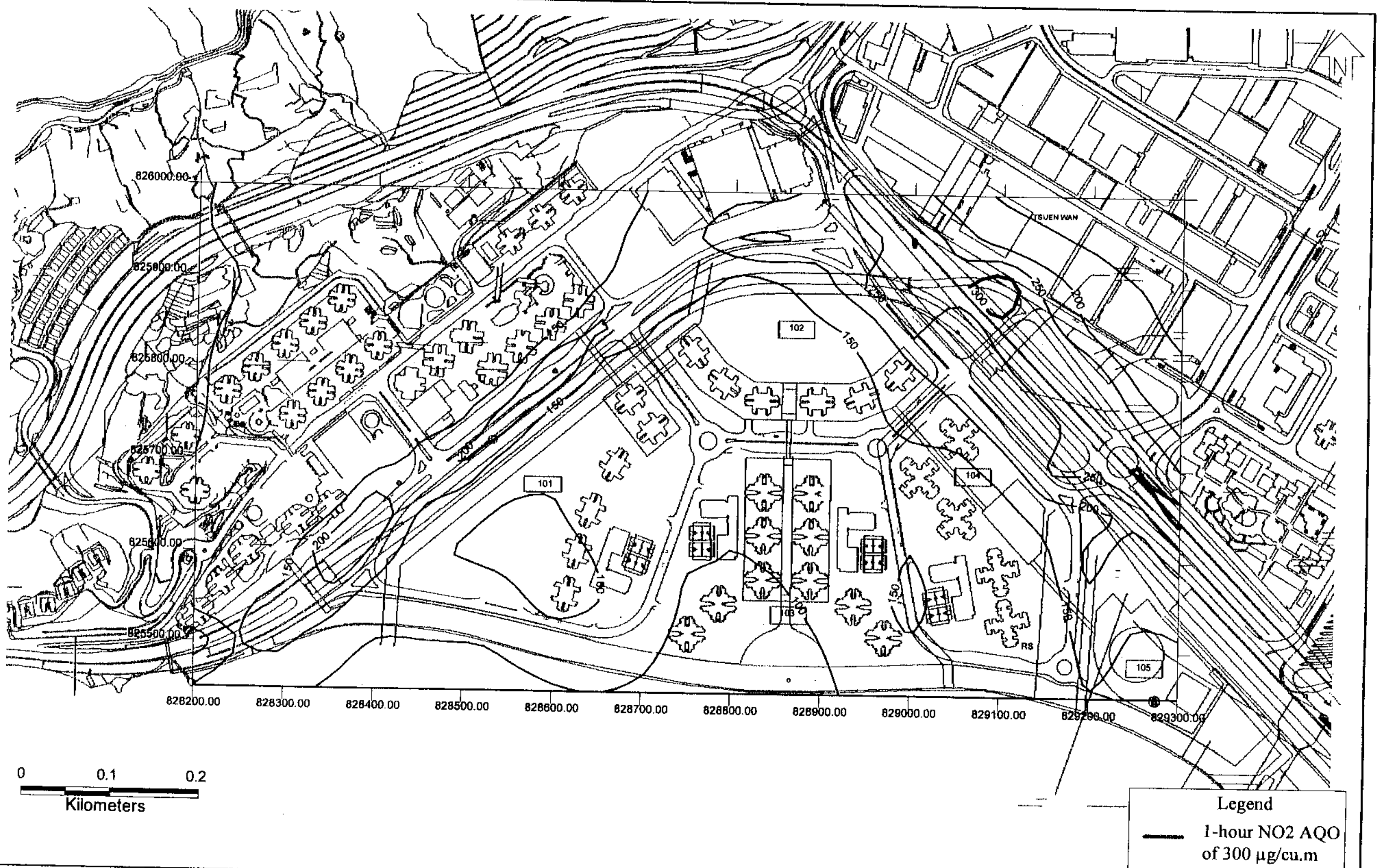

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

PREDICTED MAXIMUM 1-HOUR AVERAGE TSP CONCENTRATION AT 1.5M ABOVE GROUND (WITH 50% DUST MITIGATION) (unit µg/cu.m)

| | |
|---|---|
| FIGURE | 6.2 |
| SCALE | 1 : 6000 |




| | | | |
|---|---|---|---|
| TSUEN WAN BAY FURTHER RECLAMATION, AREA 35 | | FIGURE | 6.3 |
| PROPOSED LOCATION OF THE VENTILATION SHAFT | | SCALE | 1 : 5000 |

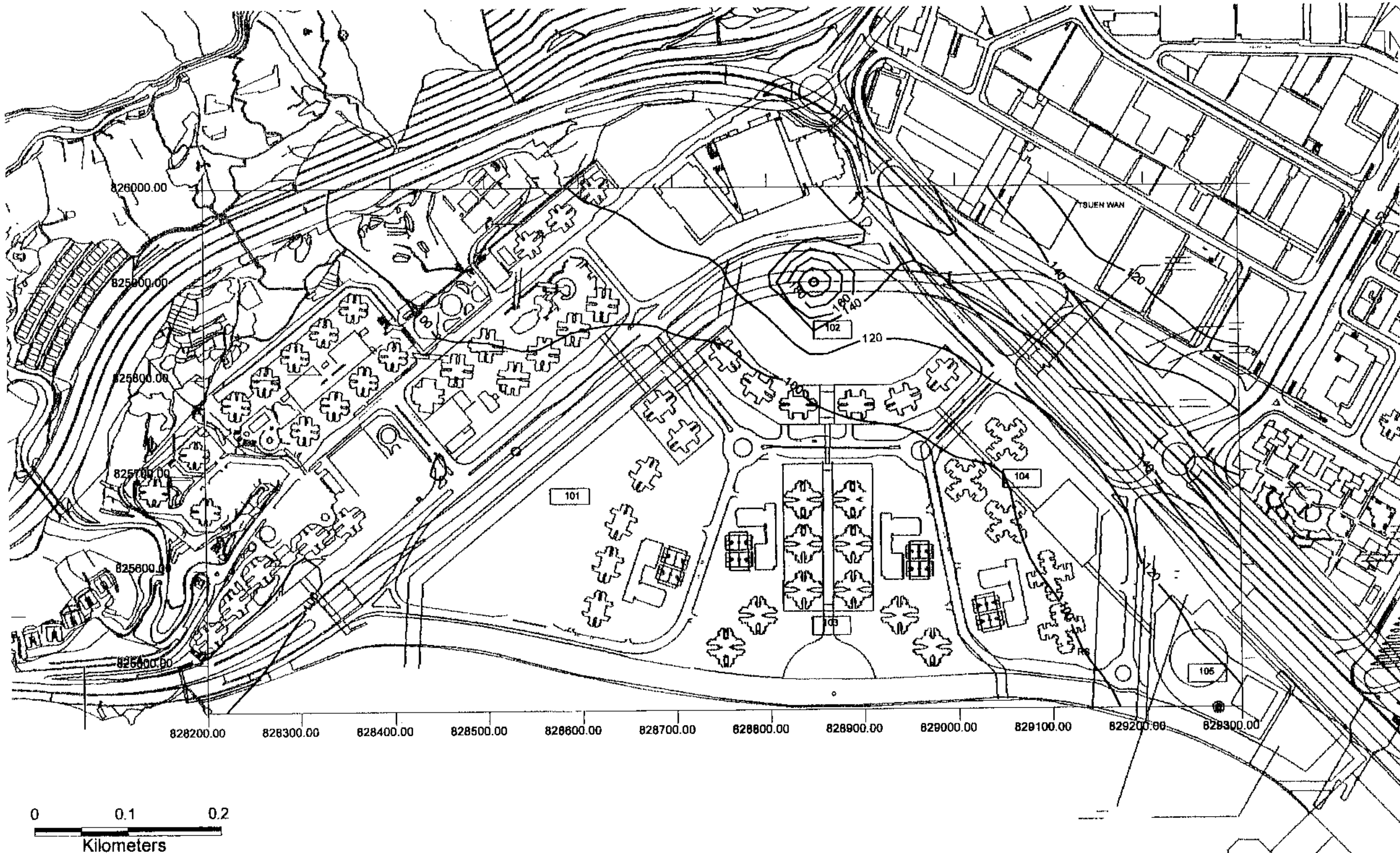



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

TRAFFIC EMISSION IMPACT (INCLUDING 30% PORTAL EMISSION & 70% VENTILATION SHAFT EMISSION) PREDICTED 1-HOUR NO2 CONCENTRATIONS AT 1.5m ABOVE GROUND (unit μg/cu.m)

| | |
|---|---|
| FIGURE | 6.4 |
| SCALE | 1 : 6000 |

B010

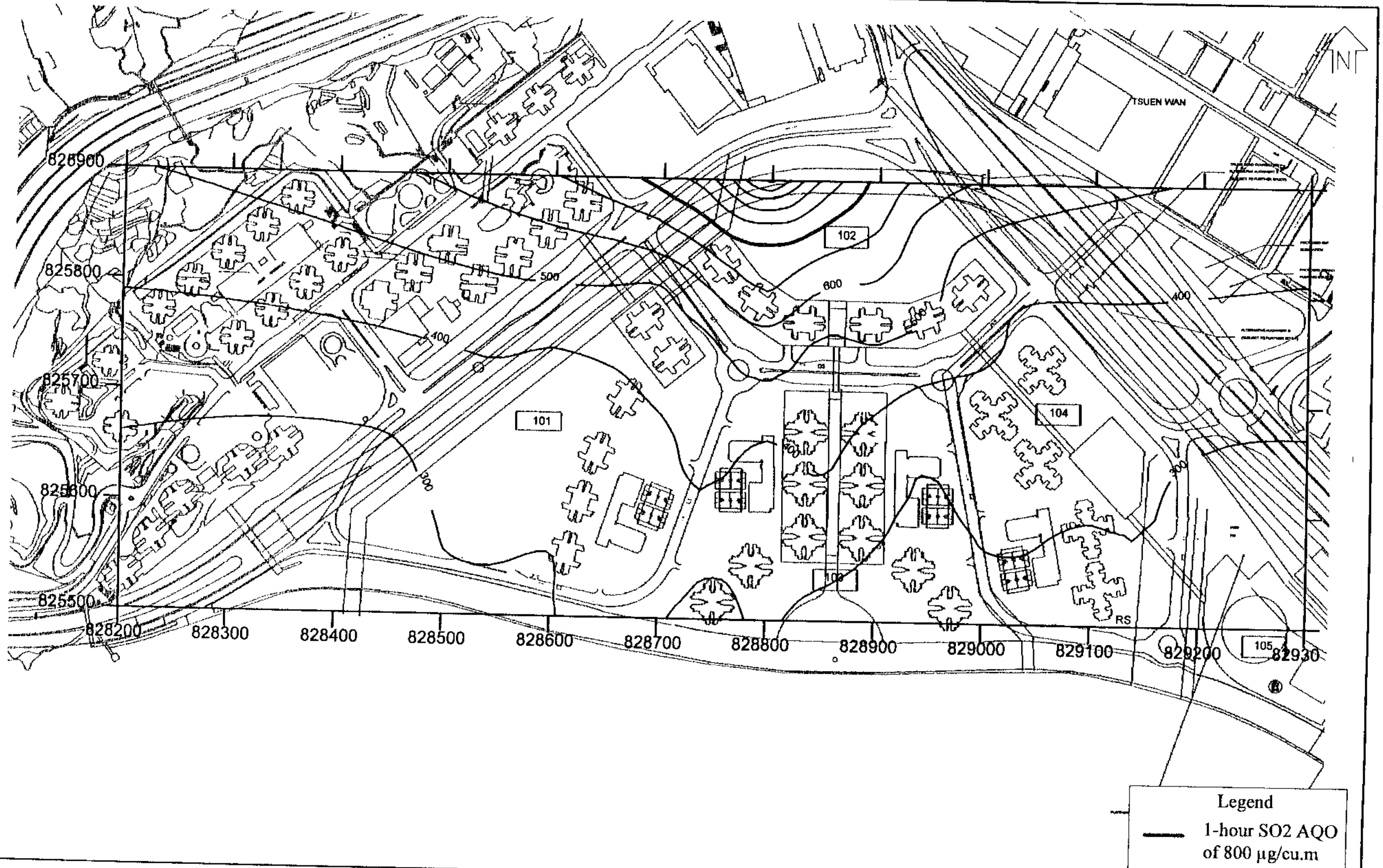



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

TRAFFIC EMISSION IMPACT (INCLUDING 30% PORTAL EMISSION & 70% VENTILATION SHAFT EMISSION) PREDICTED 1-HOUR NO2 CONCENTRATIONS AT 30m ABOVE GROUND (unit µg/cu.m)

| | |
|---|---|
| FIGURE | 6.5 |
| SCALE | 1 : 6000 |

B010

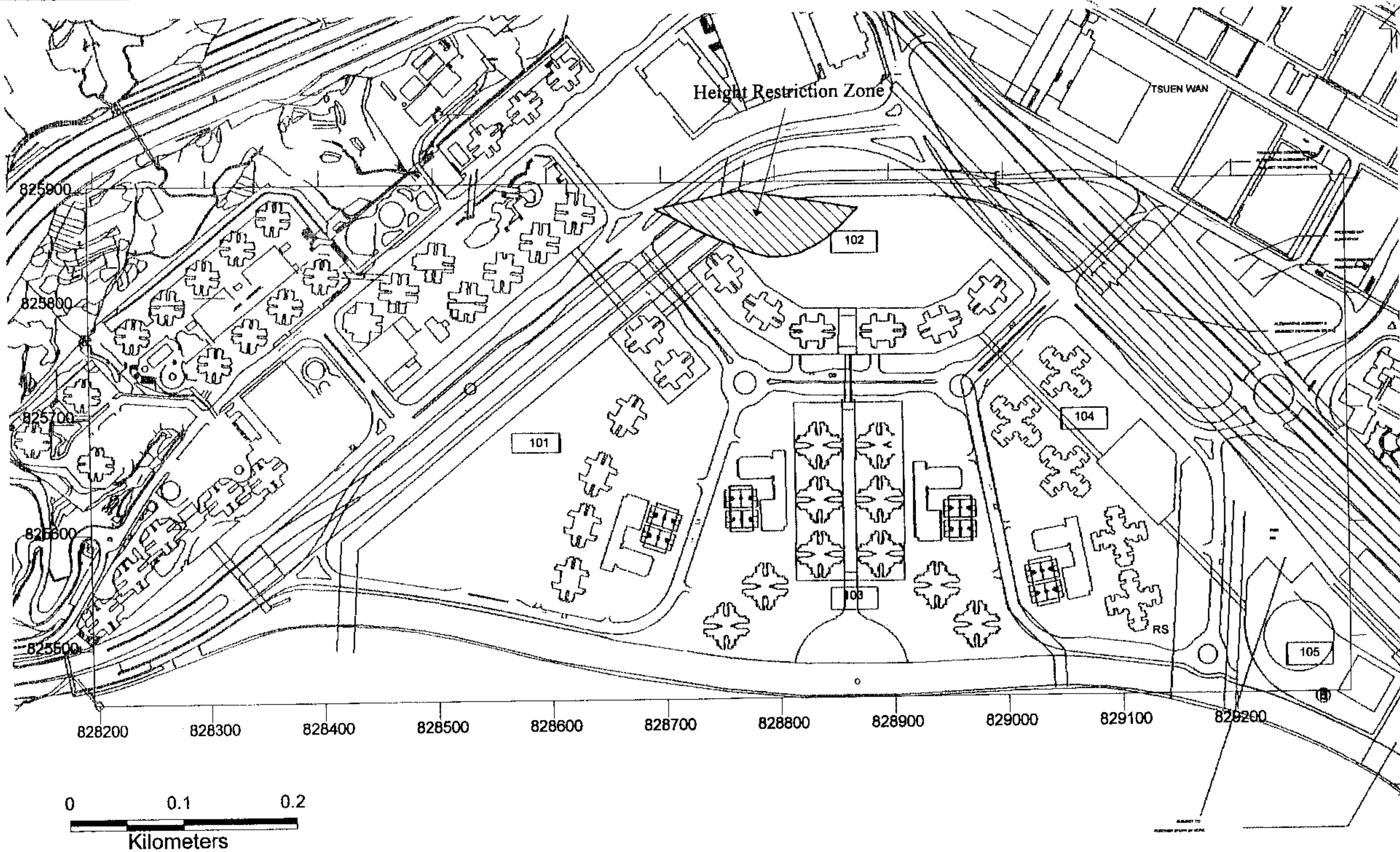



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

PREDICTED 1-HOUR AVERAGE SO2 ISOPLETH (µg/cu.m) AT THE WORST AFFECTED ELEVATION (AT 130M ABOVE GROUND)

| | |
|---|---|
| FIGURE | 6.6 |
| SCALE | 1 : 5000 |

B010




Note : A building height restriction of 90m is proposed for the height restriction zone

| | | |
|---|---|---|
| TSUEN WAN BAY FURTHER RECLAMATION, AREA 35 | FIGURE | 6.7 |
| HEIGHT RESTRICTION ZONE | SCALE | 1 : 5000 |

# 7 WATER QUALITY ASSESSMENT

## 7.1 Construction Phase Impacts

*Phasing of Reclamation*

7.1.1 The tentative programme of the proposed TWB further reclamation is spread over about a four and a half years between 2002 and 2006 as shown in **Figure 2.5**. It is proposed that the reclamation will be carried out in five phases as summarised in **Table 7.1**. The proposed phases of the reclamation are also shown schematically in **Figures 7.1 - 7.5**.

7.1.2 A major environmental concern related to water quality is that enclosed or semi-enclosed water bodies can be formed during reclamation in case the reclamation is not carefully planned. Formation of embayment, where flushing would be poor, should be avoided as far as practicable. Existing polluted storm water may be drained into the embayment and cause deterioration to the water quality within the reclamation site.

7.1.3 As shown in **Table 7.1**, it is proposed that a seawall would be partially constructed to a height of about 4 to 5 m above the existing seabed level along the southern site boundary during the first stage of the reclamation work to contain sediment plume transport during reclamation. Since this submerged seawall would only obstruct flow in the bottom layer, there would be still sufficient capacity to maintain a tidal exchange between the bay and the main channel at the upper layer.

7.1.4 The whole reclamation would be carried out in five phases. During each phase, only a part of the site would be reclaimed. The phasing is planned in such a way that priority sites for housing will be reclaimed first while avoiding formation of embayed areas. Reclamation will be carried out at the eastern side first, then the western side such that a water channel can still be maintained. Then the northern side of the site will be reclaimed, followed by the remaining southern site.

7.1.5 Stormwater drains along the existing seafront would be diverted following the schedule shown in **Figures 7.1 - 7.5**. Storm drains will be diverted once that part of the site is reclaimed and all flow would eventually be brought to points on the southern site boundary. Impact on the water quality due to polluted storm water discharged into Tsuen Wan Bay during reclamation should be minimal.

7.1.6 Due to the completion of the *Tsuen Wan, Kwai Chung and Tsing Yi SMP*, most of the expedient connections in the storm drains within the area should have been removed by 2002. There may still be a small amount of expedient connections. Typical stormwater would also contain a certain amount of pollutants. However, the level of pollutants would be low and would unlikely produce any quantifiable adverse effects on the receiving water bodies. Notwithstanding the above comment, it is recommended to review the pollution status in storm drains and the effectiveness of the sewerage improvement works by collecting field samples during the detailed design stage of the project, when most improvement works should have been completed. If this review indicates that pollution in storm drains would be a concern, further consideration can be still given, well in advance of the reclamation, to rectify the situation.

**Table 7.1 Description of the Reclamation Phases**

| Phase | Period | Description | Figure |
|---|---|---|---|
| I | Jul 2002 - Nov 2002 | (i) Placement of about 2 m of sandfill commencing from northern corner of the Reclamation.<br>(ii) Dredging of marine mud from seawall and dumping on placed sandfill within Area 35.<br>(iii) Partial construction of the seawall to a height of about 4 m to 5 m from the existing seabed level.. | 7.1 |
| II | Oct 2002 - Jan 2004 | (i) Fill-in with 2 m of sand fill within the whole Area 35 over, placed dredged mud, and continue filling-in ensuring at all times, a leading edge slope angle of 1V:15H or less is maintained..<br>(ii) Install vertical band drains within Areas A and B from marine based plant.<br>(iii) Build to completion the Eastern section of seawall.<br>(iv) Commence placement of public dump within Areas A and B up to +6.5 mPD. | 7.2 |
| III | Feb 2003 - Apr 2005 | (i) Build the western section of the seawall to +4.5 mPD. (Continue building the rest of the seawall to completion with access for marine vessels left at a central location).<br>(ii) Commence placement of 2 m thick layer of reclamation sandfill in Area C. Ensure sufficiently shallow slopes along the northern and western edges to maintain a Factor of safety of at least 1.2.<br>(iii) Install vertical band drains from marine based plant from within Area M.<br>(iv) Place public dump and sandfill up to +6.5 mPD within Area M. Place only sandfill up to +2.0 mPD within Area L. Install vertical band drains from land based plant in Area L..<br>(v) Place public dump up to +6.5 mPD in Area L..<br>(vi) Place and maintain surcharge for the required duration.<br>(vii) Remove surcharged and place general fill and compact if required up to formation level.. | 7.3 |
| IV | Feb 2004 - Apr 2006 | (i) Place sandfill to +2.0 mPD within Area D, maintaining stable leading edges.<br>(ii) Install vertical band drains from land based plants from +2.0 mPD.<br>(iii) Place public dump from +2.0 mPD to +6.5 mPD.<br>(iv) Place and maintain surcharge for the required duration.<br>(v) Remove surcharge and place general fill and compact it to the required formation level. | 7.4 |
| V | Feb 2005 - Sept 2006 | (i) Install vertical band Drains from marine based plant in Area E.<br>(ii) Place Public Dump and sandfill to +6.5 mPD.<br>(iii) Place and maintain surcharge for the required duration.<br>(iv) Remove surcharge and place general fill and compact if required up to formation level. | 7.5 |

*Dredging Impacts*

7.1.7 As indicated in **Table 7.1**, construction activities involve dredging of mud along the alignment of the seawall on the southern site boundary. Construction methods proposed for the reclamation would require only a minimal amount of dredging (for the seawall foundation) and sediments in the bay will mostly remained undisturbed, with the installation of vertical band drains to accelerate consolidation. Preliminary site investigation indicated that at the dredging locations, contaminated mud only exists at the shallow top layer. The intention is to reuse the dredged materials on site instead of disposal off site. Further discussions on mud disposal are addressed in **Chapter 8**.

7.1.8 Dredging activities, as well as the dumping and filling activities, would disturb the bottom sediments and cause release of sediments to the open waters in the Rambler Channel. This would cause an elevation in the suspended solids concentration in the water nearby. Contaminants adsorbed on the solid particles may also be released during the process.

7.1.9 A submerged seawall will be built along the southern site boundary during the first stage of the work, the purpose of which is to contain suspended solids and other pollutants generated during the dumping and filling activities. Upon completion of the submerged wall, current within the bay will be reduced. Solid particles released during dumping or filling will tend to settle due to their own weight and mostly stay within the bay, and release of sediments outside the reclamation site would be minimised. Major concern would therefore be the impacts during the construction of the seawall.

7.1.10 The critical stage will be Phase I of the reclamation work when both dredging and dumping of mud together with sand filling are carried out concurrently, before the formation of the submerged seawall. Duration for this critical stage would not be long and last only for a maximum of three months. Rate of various activities during this worst case is shown in **Table 7.2**.

**Table 7.2 Average Rate of Dredging and Filling Activities**

| Placement of Sand Fill ($m^3$ per day) | Dredging of Marine Mud ($m^3$ per day) | Dumping of Marine Mud ($m^3$ per day) |
|---|---|---|
| 9000 | 6500 - 7500 | 6500 - 7500 |

7.1.11 To quantify the impacts during this critical phase, sediment plume modelling was carried out by a modelling subconsultant. Details of modelling approach and results are attached in **Appendix C** - *"TELEMAC 3D Modelling of Tidal Flow and Sediment Plume Modelling for the TWBFR - Issue 1 " 8/97.*

7.1.12 The following worst case scenario is assumed for the sediment plume modelling :

- dredging the seawall trench, with two grab dredgers working at total rate 7,500 $m^3$ per day;

- dumping of the dredged mud into TWB, with two bottom dumping barges working at total rate 7,500 $m^3$ per day;

- sand filling on top of the dumped mud, with two barges working at total rate 9,000 $m^3$ per day; and

- Filling for the sand blanket on top of existing mud, with one barge working at rate 4,500 $m^3$ per day.

The length of a working day is assumed to be 12 hours.

7.1.13 For each of the above activity, the assumed losses of fine sediments are as follows :

- dredging the seawall trench : 4.24 kg $s^{-1}$;

- dumping of the dredged mud : 4.24 kg $s^{-1}$;

- sand filling on top of dumped mud : 9.82 kg $^{s-1}$;

- filling of sand blanket on top of existing mud : 4.91 kg $s^{-1}$.

7.1.14 Flow data were provided by the TELEMAC 3D model of tidal flows which included the 2004 baseline and the completed KCRC reclamation. These flow simulations were carried out as part of the EIA for the KCRC reclamation. Simulations was carried out for the dry season spring tide and the wet season neap tide.

7.1.15 Details of the modelling results are attached in **Appendix C**. Contours of the predicted suspended solids concentration during time of maximum plume spreading are presented in **Figure 104** and **Figure 109** of the appendix, for the dry season spring tide and wet season neap tide respectively. As shown in **Figure 104** of the appendix, maximum spreading for the dry season spring tide occurs after the construction activities have stopped. Maximum spread during dredging activities for this scenario is shown in **Figure 105** of the appendix. For both scenarios the plume travels a greater distance on the ebb than on the flood. The dry season spring plume travels into the Northern Fairway while the wet season neap plume merely reaches the Kwai Chung container terminal. The dry season spring scenario shows a much greater excursion of the plume on the ebb tide than for the wet season neap scenario. Similarly, on the flood tide the plume is significantly larger for the dry season spring scenario than for the wet season neap. The greater excursion is because of the much larger current speeds in the Rambler Channel for the dry season spring tide.

7.1.16 It can also be shown in the figures that sediments travel further in the bottom layer than the surface layer. This is because sediment particles tend to settle due to their own density while they are being advected by the tidal current.

7.1.17 Time series of the predicted elevation of suspended sediments (SS) at various sensitive receivers are plotted in **Figures 102** and **103** for the dry season spring tide, and **Figures 107** and **108** for the wet season neap tide. Predicted results are summarised in **Table**

7.3 and **Table 7.4**. Locations of those sensitive receivers are shown in **Figure 4.2**.

7.1.18 **Tables 7.3** and **7.4** show that those beaches lying to the west of the site would not be affected by the reclamation works. This is due to their distant location away from TWB. The mariculture zone at Ma Wan would also be unaffected.

**Table 7.3 Summary of Sediment Plume Modelling Results for Dry Season Spring Tide**

| Sensitive Receiver | Predicted Maximum Increase in SS (mg $l^{-1}$) | | Duration in which elevation of SS will be experienced (hours in a tidal cycle) | |
|---|---|---|---|---|
| | Surface Layer | Bottom Layer | Surface Layer | Bottom Layer |
| Gemini Beaches | negligible | negligible | 0 | 0 |
| Ho Mei Wan | negligible | negligible | 0 | 0 |
| Casam Beach | negligible | negligible | 0 | 0 |
| Lido Beach | negligible | negligible | 0 | 0 |
| WSD Tsuen Wan Intake | **15** | **50** | 4 | 8 |
| KCRC Temporary Intake | 4 | **30** | 4 | 8 |
| Tsing Yi Intake | 2 | 7 | 3 | 6 |
| Kwai Chung Incinerator | **15** | **11** | 5 | 6 |
| SSDS Stage I Phase I Intake | 2 | 4 | 3 | 6 |
| Oil Depot Pump House S | 2 | 4 | 3 | 6 |
| Oil Depot Pump House N | 1 | **12** | 3 | 4 |
| Tsing Yi Pumping Station | 1 | 3 | 1 | 2 |

Notes: Exceedances of the 8 ppm are bolded and shaded.

**Table 7.4 Summary of Sediment Plume Modelling Results for Wet Season Neap Tide**

| Sensitive Receiver | Predicted Maximum Increase in SS (mg $l^{-1}$) | | Duration in which elevation of SS will be experienced (hours in a tidal cycle) | |
|---|---|---|---|---|
| | Surface Layer | Bottom Layer | Surface Layer | Bottom Layer |
| Gemini Beaches | negligible | negligible | 0 | 0 |
| Ho Mei Wan | negligible | negligible | 0 | 0 |
| Casam Beach | negligible | negligible | 0 | 0 |
| Lido Beach | negligible | negligible | 0 | 0 |
| WSD Tsuen Wan Intake | **90** | **100** | 10 | 10 |
| KCRC Temporary Intake | **55** | **55** | 8 | 8 |
| Tsing Yi Intake | negligible | 2 | 0 | 2 |
| Kwai Chung Incinerator | negligible | **12** | 0 | 7 |
| SSDS Stage I Phase I Intake | negligible | negligible | 0 | 0 |
| Oil Depot Pump House S | negligible | negligible | 0 | 0 |
| Oil Depot Pump House N | negligible | negligible | 0 | 0 |
| Tsing Yi Pumping Station | negligible | negligible | 0 | 0 |

Notes: Exceedances of the 8 ppm are bolded and shaded.

7.1.19 Maximum increase in suspended solids is presented for both the surface and the bottom layer. The former case is more relevant to those intakes near the site as intakes are normally situated at the upper water layer. The existing WSD intake at Tsuen Wan has its invert level at about -2.6 mPD.

7.1.20 The WQO specifies that waste discharge shall not to cause an elevation in SS by 30% of the natural ambient level. This criteria is normally adopted to assess the dredging impact on the sensitive receivers. It is also a usual practice to adopt the 95 percentile as the baseline ambient level. For this study, EPD regular monitoring data at Station VM14 in the Rambler Channel is used to establish this baseline, which corresponds to a value of about 26 mg $l^{-1}$. EPD's measurements also indicate that this baseline value for different water layers is roughly of the same magnitude. Adopting this value, an increase of SS not greater than 8 mg $l^{-1}$ at the sensitive receivers will be deemed to be acceptable.

7.1.21 Predicted values of over 8 mg $l^{-1}$ are highlighted in **Table 7.3** and **Table 7.4**, which indicated that there would be dredging impacts on WSD Tseun Wan Intake, KCRC Temporary Intake, Kwai Chung Incinerator and Oil Depot Pump House N.

7.1.22 For the Oil Depot Pump House N intake in Tsing Yi, exceedance of 8 mg $l^{-1}$ is only predicted for the bottom layer. At the surface layer, predicted elevation in SS is only

1 mg $l^{-1}$. In view of the fact that this intake is situated at the top layer and sensitive only to the water quality at this upper layer, it is unlikely that reclamation would cause an impact on this intake in Tsing Yi.

7.1.23 During the dry season spring tide, the WSD Tsuen Wan intake and the Kwai Chung Incinerator intake would be subject to an elevation of SS above 8 mg $l^{-1}$ during the worst case reclamation scenario. This elevation is about 15 mg $l^{-1}$ at the surface layer. For the wet season neap tide, much higher levels of surface SS increase are predicted at the WSD intake and KCRC Temporary Intake, which are 90 and 55 mg $l^{-1}$ respectively. On the contrary increase of SS at the Incinerator Intake is negligible for the wet season, most likely due to the lower tidal flow speed during the wet season.

7.1.24 It should be pointed out that a worst case scenario is assumed for the modelling works. Loss rate for fine particles are based on open grabs without silt curtain, and it is assumed that dredging of seawall trench, dumping of dredged mud and filling of sand blankets are all concurrent. Among these activities, the dredging works would have a larger contribution to the SS release as the dredging locations are closer to the main flow channel where current is faster. Also, the locations are closer to the intakes.

7.1.25 If closed grabs are used instead of open grabs and silt curtains are provided, the sediment loss rate can be reduced by about 4 to 5 times, implying that the SS elevation can be reduced from 15 mg $l^{-1}$ to less than 8 mg $l^{-1}$ for the dry season modelled scenario.

7.1.26 According to the tentative schedule for the reclamation, the critical stage would be carried out in early 2002. If this schedule can be followed, dredging works would be carried out in a dry season. Although it has been predicted that dredging impacts would be smaller in the dry season spring tide, it should be prudent to implement proper mitigation measures during dredging/filling activities (use of closed grab dredger with silt curtain) to minimise water quality impact at the intakes to take into account changes in tidal condition that were not modelled.

7.1.27 In case of programme delay such that the worst case scenario happens in the wet season, predicted impact at the intakes would be greater and further mitigation measures should be further considered to minimise the water quality impacts at the intakes:

- to reduce the number of plant, eg. use of only one grab dredger at any one time;
- to stagger construction activities such that dredging of seawall foundation and filling of sand blanket will not be carried out on the same day.

7.1.28 With the implementation of the above measures, the sediment loss rate is estimated to be reduced to about 5% of the original estimation and water quality impacts at the intakes would likely be acceptable.

7.1.29 In the tentative schedule of works, it is assumed that dredging and filling would be carried out in a period of approximately three months. With the rate of works assumed in the modelling (dredging at 7500 $m^3$ per day), dredging works (total volume of 0.2 $Mm^3$) can be completed in about 26 working days. It may be possible that the programme can be scheduled in such a way that the rate of sediment loss can be minimised while keeping the overall schedule for the reclamation.

7.1.30 Another concern related to dredging is the release of metals into the water column due to disturbance of the bottom sediments. As discussed in the next chapter, formation of the seawall foundation will require dredging of Class C contamination mud. However, in view of the fact that volume of contaminated mud to be dredged would be minimal and dredging would only be carried out for a very short period, potential release of metals into marine environment would be minimal provided that proper mitigation measures as discussed above are implemented during dredging works.

7.1.31 Regarding the sensitive receiver of Ma Wan mariculture zone, it is not expected that dredging and reclamation works would have any impact. Modelling works indicated that the sediment plume during dredging and reclamation would not be transported to Ma Wan. This is also true regarding the bathing beaches on the western side of the site.

*Impacts during Land-based Construction Works*

7.1.32 The major potential impacts during land-based development work would be wastewater and run-off generated from the site.

7.1.33 During site formation and construction, top soil would be exposed and an elevated level of suspended particles would be present in the surface run-off. Water used for wheel washing would also have an increased level of suspend solids. Sediment laden runoff may carry pollutants (adsorbed onto the particle surfaces) which would contaminate the receiving marine waters. If uncontrolled, an excessive amount of sediments may be washed into the downstream receiver waters.

7.1.34 Domestic sewage from the workforce and wastewater generated from the canteen and mechanical workshops, if any, would also be generated during the construction phase. It is unlikely that sewage generated from the site would have an impact on the nearby environment, provided that sewage is not discharged directly to marine waters, and provided that septic tanks, grease traps or chemical toilets are established and properly maintained.

*Accidental spillage*

7.1.35 The provision of refuelling and mechanical servicing facilities will involve the storage and use of potentially hazardous materials. The intensity of activity at the project sites could give rise to significant spillage of fuel oil from the fleet of reclamation vehicles. Without effective management, the use and disposal of these substances could contaminate the air, ground and marine environment.

7.1.36 Spillage from storage tanks and drums should be controlled by the provision of a bunded area designed to accommodate 110% of the tanks capacity in case of a major rupture. All storage tanks should be fitted with high level alarms and leak detector systems. Drainage from storage tanks should be directed by a sump to oil interceptors with sufficient capacity to retain major spill, provision of stoplogs or sluicegates and a rapid response to an incident could maintain the spill within the bunded area. Fuel retained within the bund can then be pumped out and removed to another facility as appropriate. Regular maintenance of the oil interceptor and sump will be essential to ensure effective cover should a spill occur.

7.1.37 Minor but regular spillage during refuelling may become significant and should therefore be carried out on areas equipped with appropriate facilities including hard-standings, sumps, and oil interceptors. Parking areas are also a potential source of minor but regular spillage from leaking vehicles. Provision of similar spillage control arrangements are recommended, again regular maintenance is essential to maintain efficiency. Clean up of fuel spills from other areas of the project site can be achieved through use of absorbent materials, which should be available on site for this purpose.

## 7.2 Operational Phase Impacts

*Change in Flow Regime Due to Reclamation*

7.2.1 A primary concern of reclamation would be the effect on water flow. In view of the fact that the site is located on one of the major flow channels in Hong Kong, the Rambler Channel, it is important to ensure that effects on flow through the Rambler channel, hence flow in other major flow channels, due to the TWB reclamation is small and acceptable.

7.2.2 The TELEMAC 3D tidal flow modelling was used to predict changes in flow pattern, and hence the tidal discharge volume. Flow across major channels were examined and the locations of these sections are shown in **Figure 7.6**. Predictions were made for four representative tides; a spring and a neap tide in each of the dry and wet seasons. The dry spring simulation was based on the previous TWB further reclamation layout (**Figure 2.2**). After the submission of the Draft Investigation Final Report, a new layout with slight changes became feasible and the other three scenarios were simulated for this final layout for the TWB further reclamation (**Figure 2.1**).

7.2.3 For all of the tide types, the model was run for a baseline layout representing the 2004 scenario as shown in **Figure 7.7**. The configuration of the baseline runs was identical to that for scenario test runs in all aspects except that the TWB reclamation can be excluded. By comparing predicted results with baseline results, differences in flow pattern caused by the reclamation were assessed. The major parameters of concern, ie. flow through major channels, are compared in **Tables 7.5 to 7.8**. Detailed information on the hydrodynamic modelling work can be refered to **Appendix C** - the *"TELEMAC Model Calibration & Simulations for the Dry Season Spring Tide - Issue 1 " 12/96*.

7.2.4 Percentage changes of tidal flow volumes through different water channels are plotted in **Figure 7.8**. For the ease of impact comparison, only reductions of flow volume are plotted in the figure. It can be easily seen from the bar chart that reclamation of the TWB would only have observable changes for the tidal flow volume through the Rambler Channel, which are approximately 2% for most situations except for the dry season neap tide, where changes are about 3%. For all other channels, percentage changes in tidal flow volume are mostly small and less than 0.5%. An exception is the relatively high predicted reduction of flow volume (1.77%) through Victoria Harbour during a wet season spring ebb tide.

7.2.5 Although there is a predicted reduction of 2-3% in flow volume through the Rambler Channel due to the reclamation, it is not expected that water quality in the channel would deteriorate during the operation phase of the TWB. This is because the reduction of flow would be compensated by the reduction of pollution load into Rambler Channel due to various sewerage improvement schemes in the area and the implementation of the SSDS Stage I.

*Water Quality at WSD Seawater Intake*

7.2.6 As mentioned in the previous paragraphs, all sewage in the TWB area will be diverted to the SSDS Stage I and most of the storm drains will be removed due to sewerage improvement works being undertaken. Therefore, pollution loads entering the Rambler Channel close to the location of WSD seawater intake would be significantly reduced. Water quality near the intake, during operational phase of the TWB, would be expected to comply with the WSD requirements for seawater intake.

**Table 7.5 Predicted Discharge Volumes for Dry Season Spring Tide**

| Discharge Section | 2004 Baseline Scenario | | 2004 Baseline Scenario + TWB Further Reclamation | | | |
|---|---|---|---|---|---|---|
| | Discharge Volume ($x10^6$ $m^3$) | | Discharge Volume ($x10^6$ $m^3$) | | Percentage Change from Baseline Scenario | |
| | Ebb | Flood | Ebb | Flood | Ebb | Flood |
| Victoria Harbour | 147.2 | 201.7 | 146.7 | 201.2 | -0.32 | -0.25 |
| Rambler Channel | 56.8 | 34.6 | 55.7 | 34.0 | -1.94 | -1.88 |
| Ma Wan | 617.7 | 602.2 | 618.1 | 602.2 | +0.06 | 0.00 |
| Kap Shui Mun | 232.7 | 261.8 | 232.4 | 262.0 | -0.13 | +0.10 |
| East Lamma Channel | 592.3 | 483.6 | 591.4 | 482.6 | -0.16 | -0.21 |
| West Lamma Channel | 426.1 | 524.5 | 426.0 | 526.5 | -0.01 | +0.38 |

**Table 7.6 Predicted Discharge Volumes for Wet Season Spring Tide**

| Discharge Section | 2004 Baseline Scenario | | 2004 Baseline Scenario + TWB Further Reclamation | | | |
|---|---|---|---|---|---|---|
| | Discharge Volume ($x10^6$ $m^3$) | | Discharge Volume ($x10^6$ $m^3$) | | Percentage Change from Baseline Scenario | |
| | Ebb | Flood | Ebb | Flood | Ebb | Flood |
| Victoria Harbour | 44.1 | 176.7 | 43.3 | 175.8 | -1.77 | -0.49 |
| Rambler Channel | 79.7 | 14.4 | 78.1 | 14.2 | -2.02 | -1.5 |
| Ma Wan | 745.1 | 529.3 | 743.9 | 528.3 | -0.16 | -0.19 |
| Kap Shui Mun | 247.6 | 200.6 | 246.7 | 200.5 | -0.37 | -0.06 |
| East Lamma Channel | 400.3 | 370.1 | 398.5 | 367.6 | -0.46 | -0.69 |
| West Lamma Channel | 816.6 | 457.6 | 817.3 | 459.1 | +0.09 | +0.33 |

**Table 7.7 Predicted Discharge Volumes for Dry Season Neap Tide**

| Discharge Section | 2004 Baseline Scenario | | 2004 Baseline Scenario + TWB Further Reclamation | | | |
|---|---|---|---|---|---|---|
| | Discharge Volume ($x10^6$ $m^3$) | | Discharge Volume ($x10^6$ $m^3$) | | Percentage Change from Baseline Scenario | |
| | Ebb | Flood | Ebb | Flood | Ebb | Flood |
| Victoria Harbour | 98.1 | 113.7 | 98.0 | 113.4 | -0.06 | -0.25 |
| Rambler Channel | 30.0 | 19.4 | 29.1 | 18.8 | -2.96 | -3.17 |
| Ma Wan | 361.7 | 310.8 | 361.8 | 310.6 | +0.03 | -0.07 |
| Kap Shui Mun | 127.2 | 131.2 | 127.1 | 131.0 | -0.11 | -0.17 |
| East Lamma Channel | 312.6 | 317.1 | 312.5 | 316.6 | -0.02 | -0.15 |
| West Lamma Channel | 165.5 | 97.0 | 165.2 | 97.1 | -0.21 | +0.01 |

**Table 7.8 Predicted Discharge Volumes for Wet Season Neap Tide**

| Discharge Section | 2004 Baseline Scenario | | 2004 Baseline Scenario + TWB Further Reclamation | | | |
|---|---|---|---|---|---|---|
| | Discharge Volume ($x10^6 m^3$) | | Discharge Volume ($x10^6 m^3$) | | Percentage Change from Baseline Scenario | |
| | Ebb | Flood | Ebb | Flood | Ebb | Flood |
| Victoria Harbour | 42.6 | 82.7 | 42.6 | 82.6 | +0.07 | -0.09 |
| Rambler Channel (S) | 43.2 | 11.9 | 42.3 | 11.6 | -1.97 | -2.20 |
| Ma Wan | 231.7 | 279.0 | 231.0 | 278.9 | -0.30 | -0.04 |
| Kap Shui Mun | 76.8 | 115.8 | 76.4 | 115.7 | -0.55 | -0.10 |
| East Lamma Channel | 32.8 | 328.7 | 32.8 | 328.1 | 0.00 | -0.16 |
| West Lamma Channel | 358.7 | 103.4 | 357.7 | 103.8 | -0.29 | +0.39 |

## 7.3 Proposed Sewerage System

7.3.1 The existing sewerage system in Tsuen Wan area comprises a gravity piped network which converges at the Tsuen Wan Sewage Pumping Station. From the Tsuen Wan Pumping station, the collected sewage is lifted and discharged to the Kwai Chung Sewage Screening Plant, from which sewage is discharged into Rambler Channel through a submarine outfall.

7.3.2 The *Tsuen Wan, Kwai Chung and Tsing Yi SMP* had identified general inadequacies in this existing trunk sewer system in Tsuen Wan. The improvement works required for Tsuen Wan area are being implemented under Contract No. Tsuen Wan DC 94/1. In the design of the hydraulic capacity of the improved sewerage system (including the Tsuen Wan Pumping Station and downstream facilities), population from the reclamation area was assumed to be 30,000. The improvement works are programmed to be completed by 1997.

7.3.3 Under the Strategic Sewage Disposal Scheme (SSDS) Stage I works the construction of Stonecutters Island Sewage Treatment Plant is underway and scheduled for completion by 2000. When the Sewage Treatment Plant is commissioned the sewage from the Kwai Chung Screening Plant will be conveyed to the treatment plant via a deep tunnel system.

7.3.4 As the SMP and SSDS works are programmed to finish ahead of the scheduled development programme for the reclamation area, the sewage from the reclamation area would be discharged to the improved Tsuen Wan sewerage system and treatment will be provided at the Stonecutters Island Sewage Treatment Plant, without the need for the separate treatment facility.

7.3.5 The design sewage flow from the reclamation area is estimated based on the flow factors provided in the DSD Sewerage Manual. The proposed sewerage layout for the reclamation is shown in **Figure 7.9**. The collector sewer will flow generally south to north by gravity to the proposed pumping station in Hoi Hing Road. In the design of the sewerage system, the assumed distribution of planning areas into the system is tabulated in **Table 7.9**.

**Table 7.9 Distribution of Planning Areas into the Sewerage System**

| Manhole No. | Planning Area |
|---|---|
| MH-A | 105 |
| MH-B | 103A, 104B |
| MH-C | 101B, 101A |
| MH-D | 102A, 103B |
| MH-E | 103C, 104A |

7.3.6 From the proposed pumping station a 450 mm diameter rising main is proposed to convey the sewage to Wing Shun Street where a short length of 525 diameter gravity sewer will be provided for connection into the existing 2100 mm diameter trunk sewer in Texaco Road. The existing trunk sewer and the Tsuen Wan Pumping Station have been found to have sufficient capacities to receive the sewage flows from the reclamation. Due to the presence of numerous large stormwater culverts, it is not feasible to provide a gravity sewer between the proposed pumping station and Texaco sewer.

7.3.7 The route of the rising main is chosen to avoid construction in existing congested streets where conflicts with utilities and traffic are expected to pose major constraints during construction. There may be a potential septicity problem associated with the long sewage rising main. Sewage may become anaerobic in the rising main if it stays for a long period, resulting in generation of hydrogen sulphide causing corrosion and odour problem. This has to be further addressed during the detailed design stage.

## 7.4 Mitigation Proposals

7.4.1 To aviod deterioration of water quality resulting from potentially polluted storm runoff into any temporary embayments formed during reclamation, diversion of storm drains should be carried out at early stages. The time and sequence of the flow diversion work should follow the schedule shown in **Figures 7.1 - 7.5**.

*Mitigation of Dredging, Filling and Dumping Impacts*

7.4.2 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 Temporary 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; and

- Environmental monitoring should be carried out during dredging, filling and reclamation activities at WSD seawater intake. Monitoring should be arranged in accordance with the Environmental Monitoring & Audit (EM&A) Manual and results should be sent to WSD on daily basis for information. If monitoring results indicate that the reclamation activities caused a significant impact to the sensitive receivers, construction programmes should be scheduled carefully to slow down construction activities (e.g. dredging of seawall foundation and filling of sand blanket would not be carried out concurrently, or to reduce the number of plant) such that water quality at the intake could meet WSD water quality objectives.

7.4.3 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.

7.4.4 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 shown below:

- 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.

7.4.5 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 Impacts*

7.4.6 Septic tanks or chemical toilets should be used as far as practicable. Grease traps should also be provided for wastewater generated from canteens. 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.

7.4.7 The site 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;

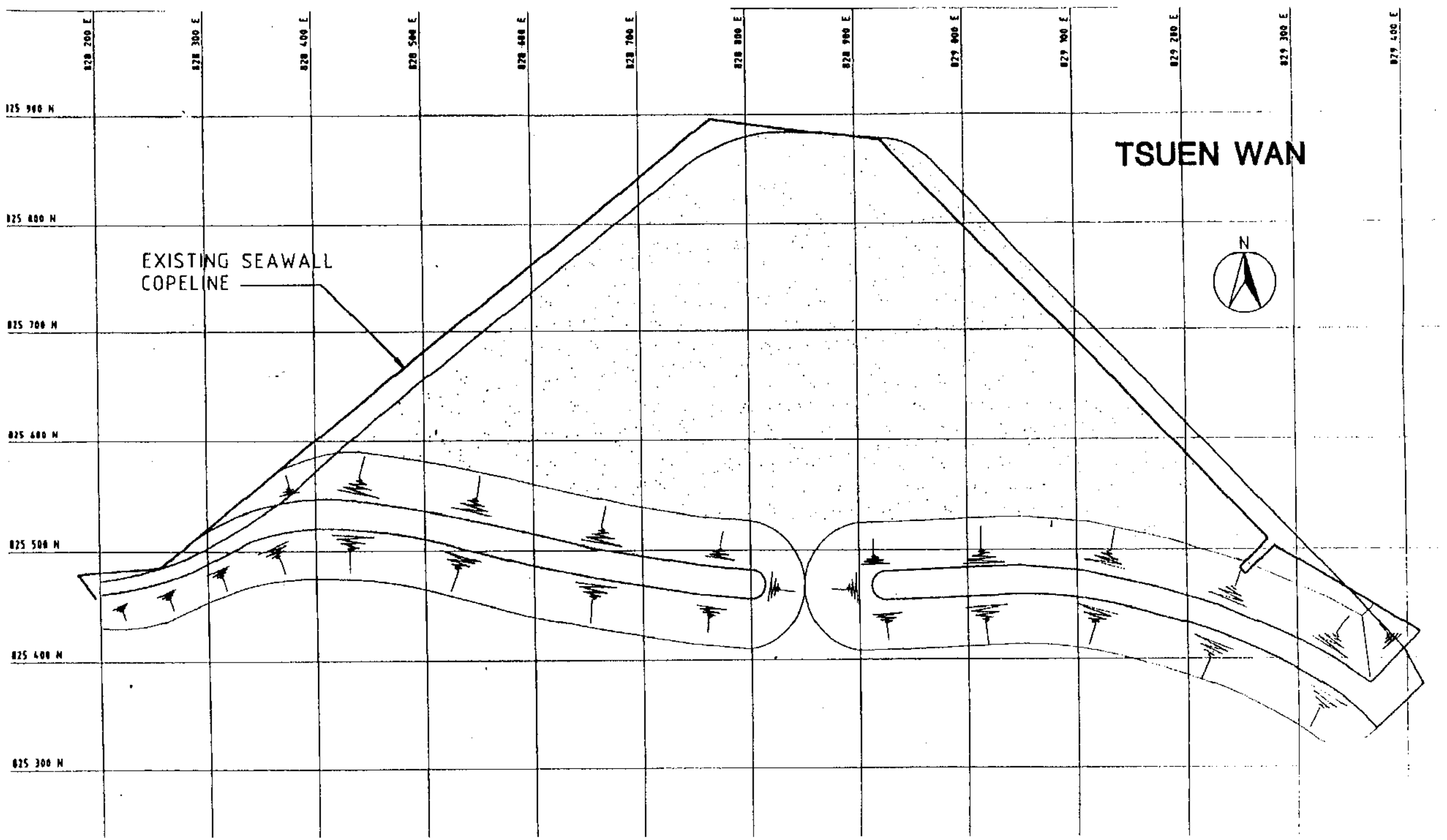
- Careful programming of the works to minimise soil excavation works during rainy seasons;

- 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.



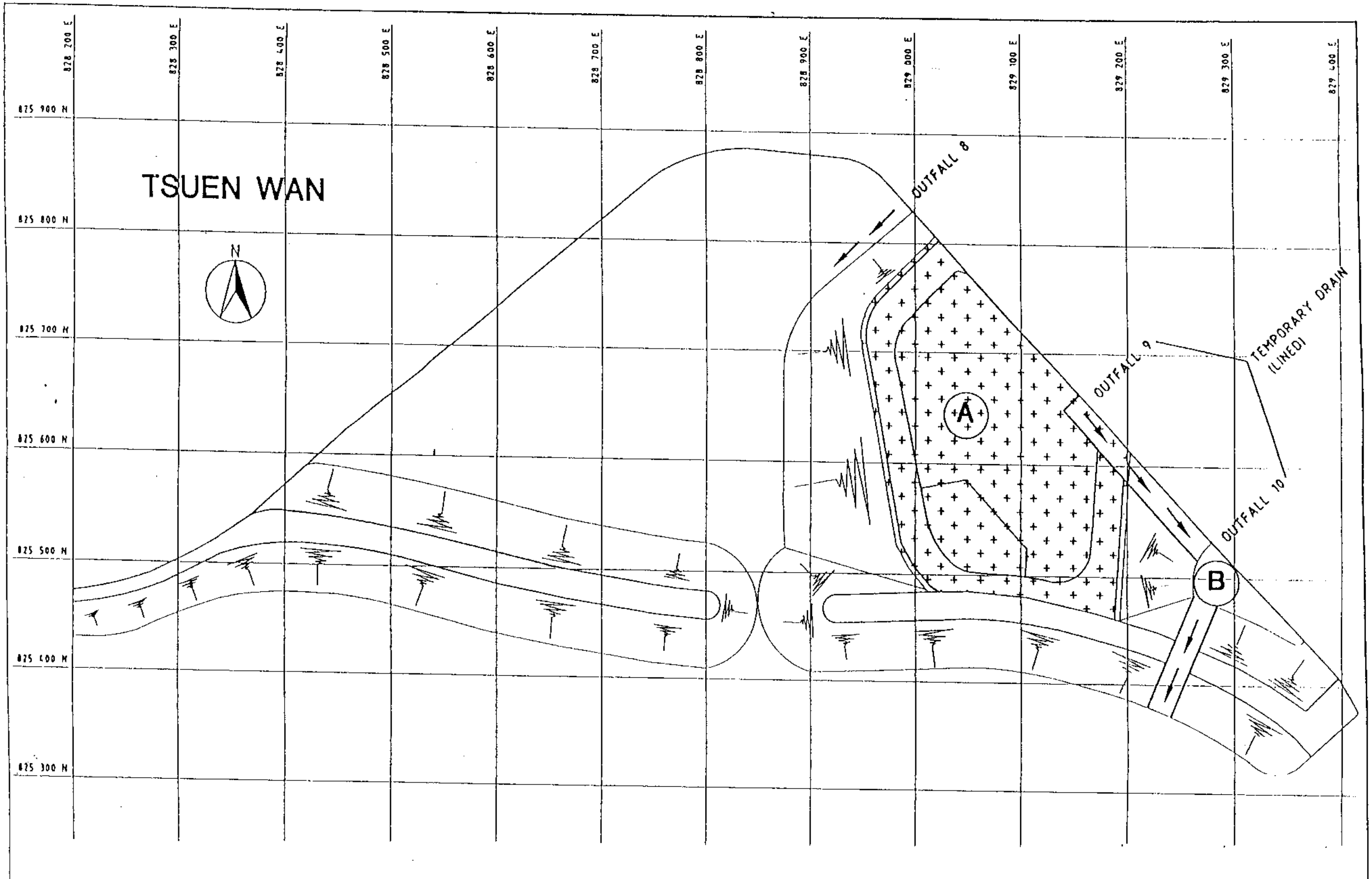

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

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

FIGURE 7.1

SCALE NOT TO SCALE

B010



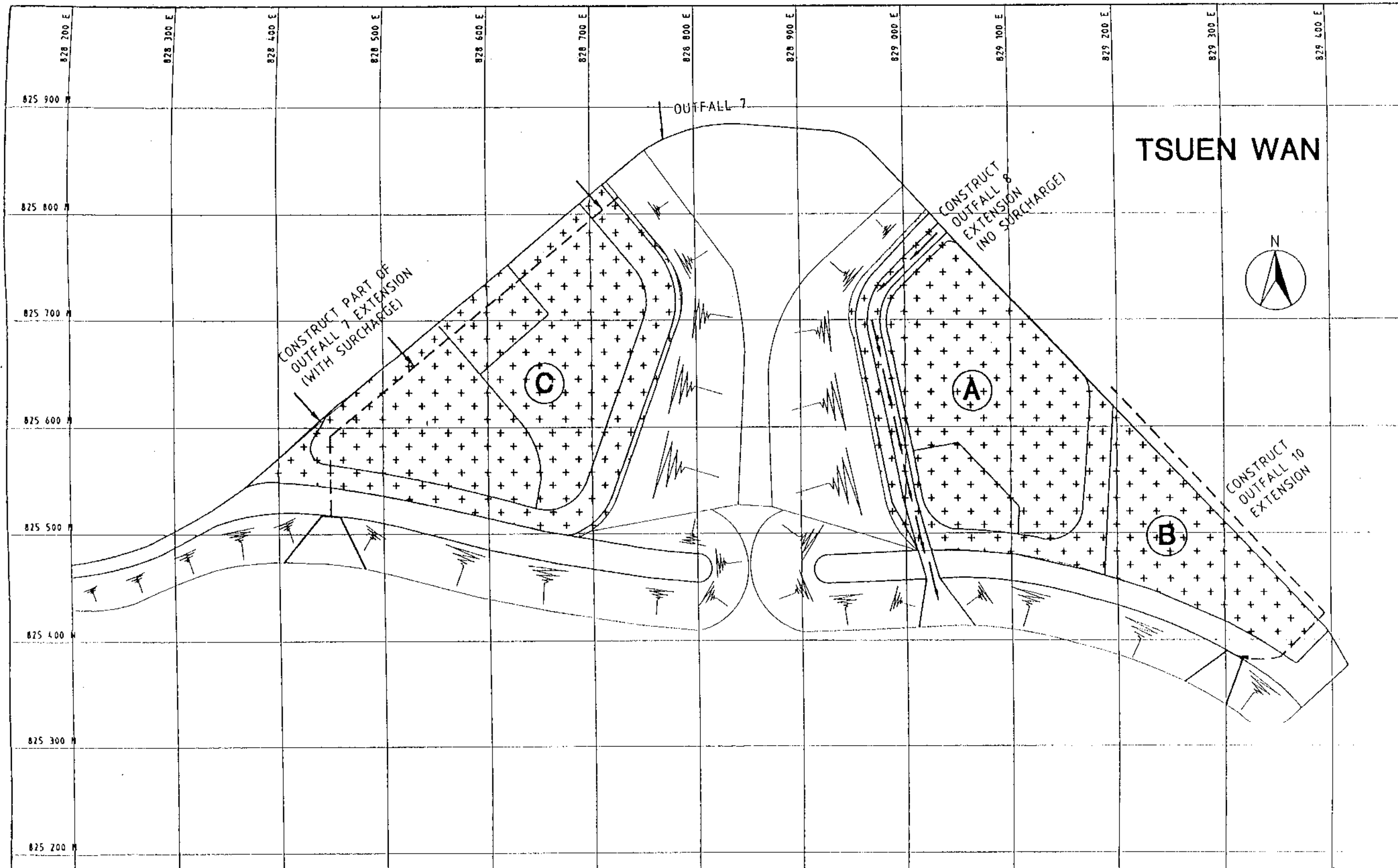

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

PHASE II OF THE RECLAMATION AND TEMPORARY DRAINING DIVERSION

FIGURE 7.2

SCALE NOT TO SCALE

B010

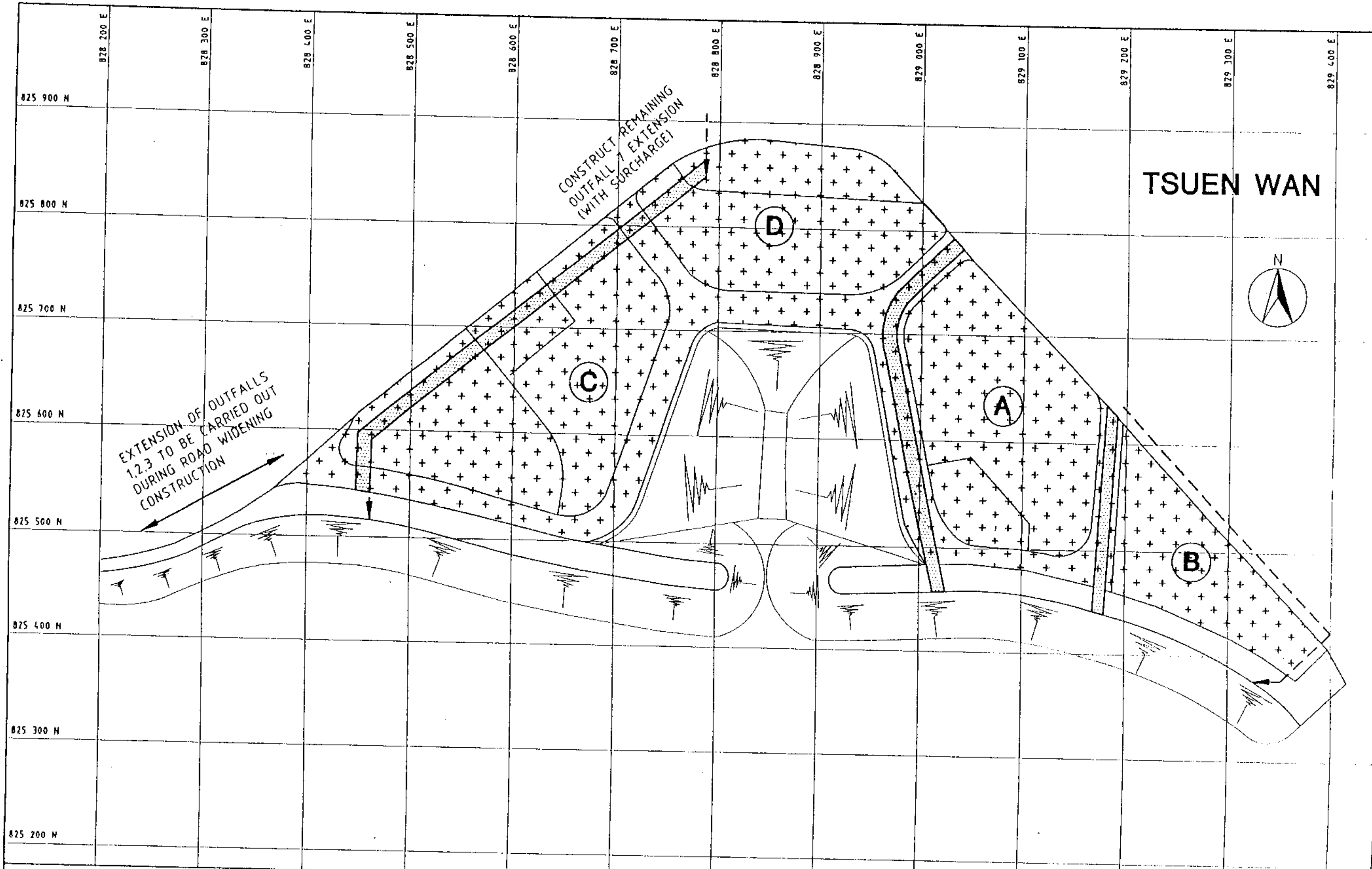



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

PHASE III OF THE RECLAMATION TEMPORARY DRAINAGE DIVERSION

FIGURE 7.3

SCALE : 1 : 5000

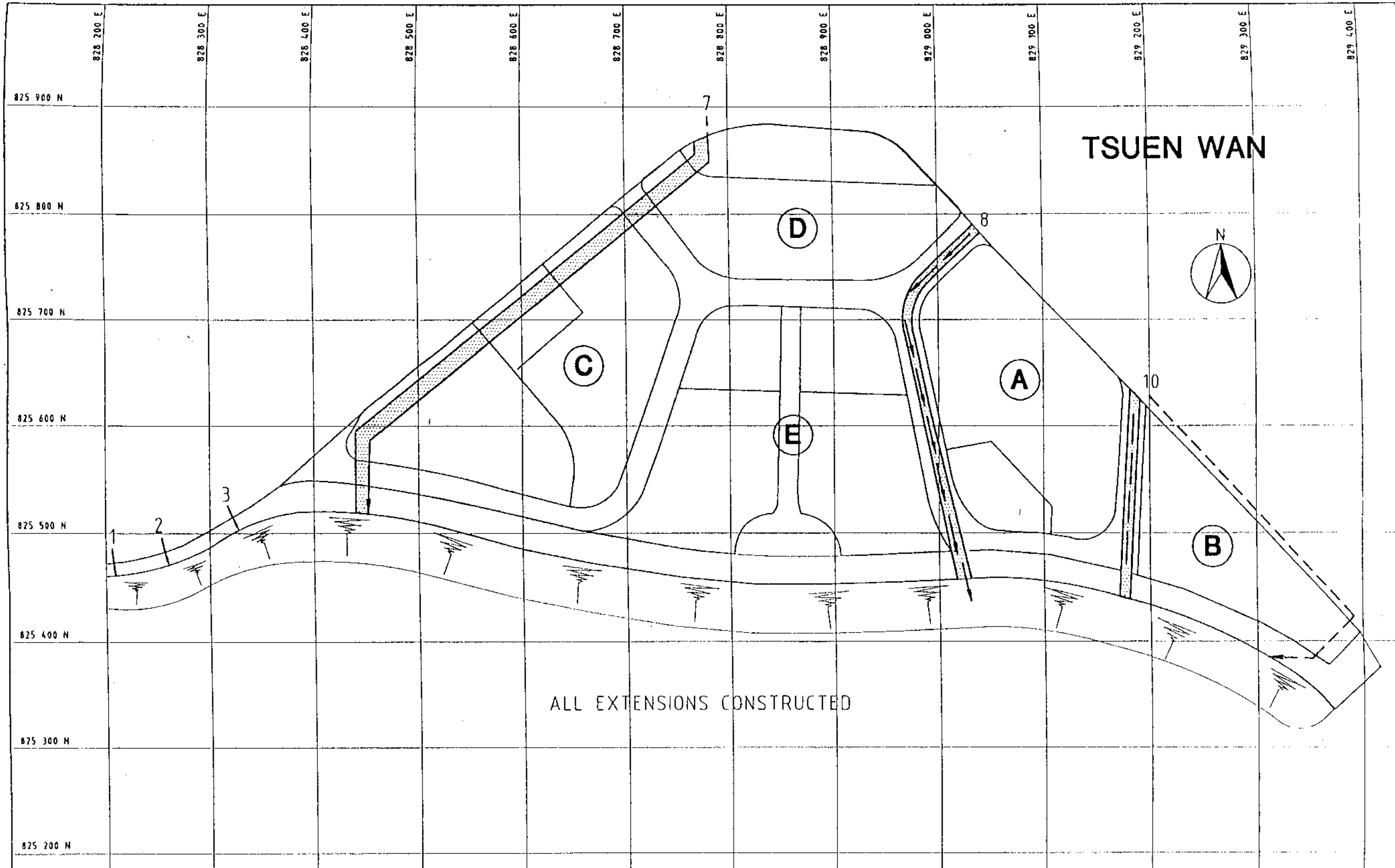



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

PHASE IV OF THE RECLAMATION TEMPORARY DRAINAGE DIVERSION

FIGURE 7.4

SCALE : 1 : 5000

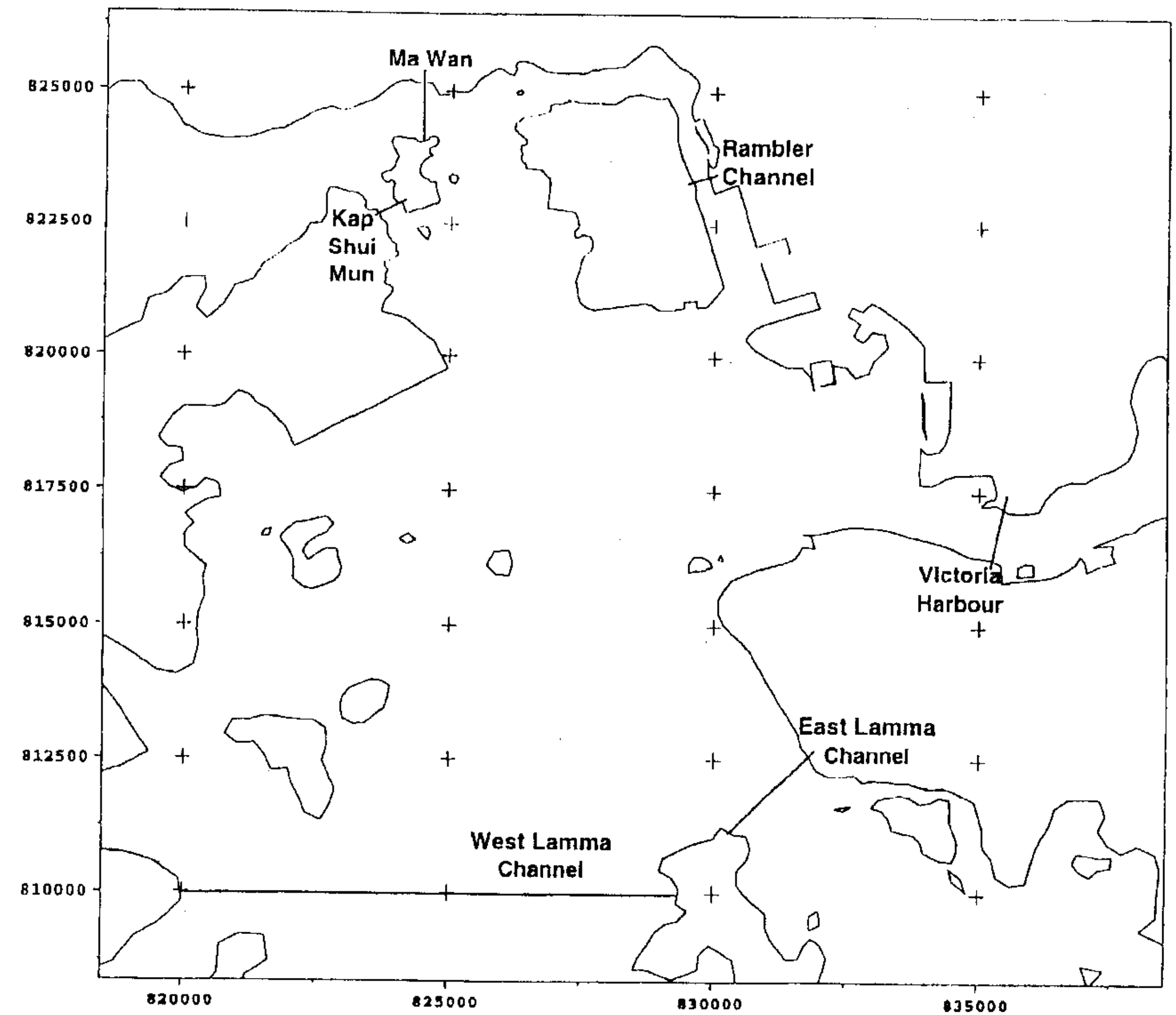



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

PHASE V OF THE RECLAMATION TEMPORARY DRAINAGE DIVERSION

FIGURE 7.5

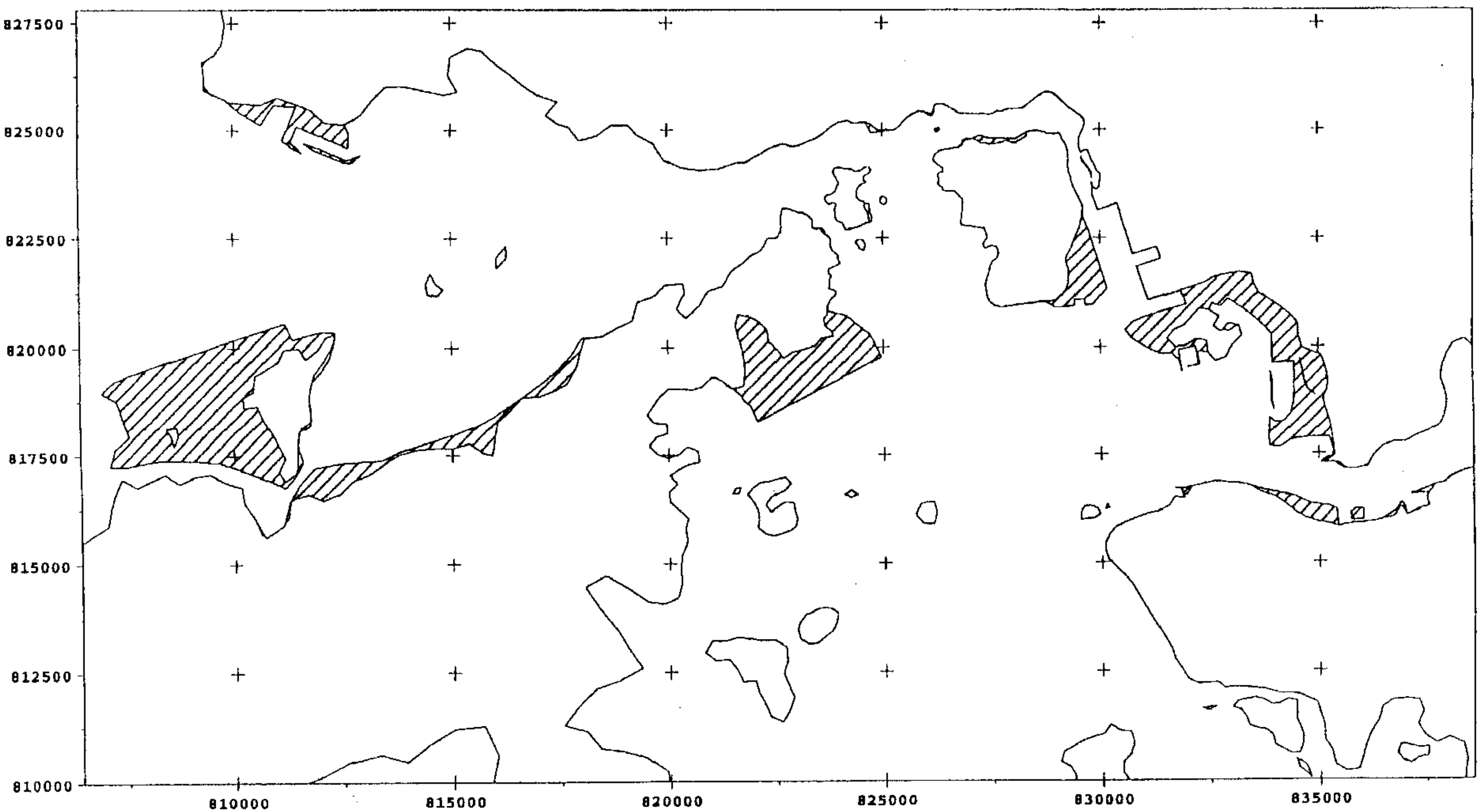
SCALE : 1 : 5000




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

SECTIONS USED FOR DISCHARGE CALCULATIONS

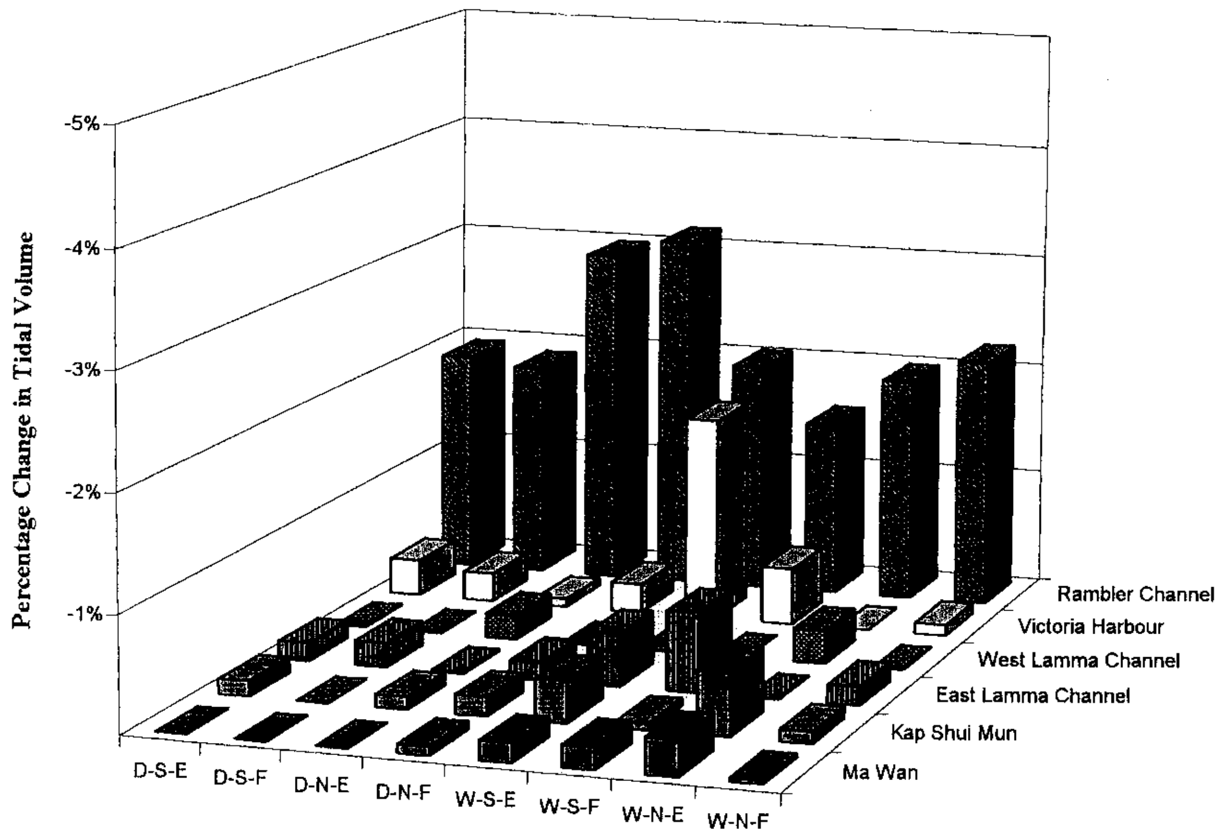
| | |
|---|---|
| FIGURE | 7.6 |
| SCALE | NOT TO SCALE |




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

CHANGES TO MODEL COASTLINE, 1990-2004

| | |
|---|---|
| FIGURE | 7.7 |
| SCALE | NOT TO SCALE |




Legend :

| | |
|---|---|
| D-S-E | Dry Season Spring Ebb Tide |
| D-S-F | Dry Season Spring Flood Tide |
| D-N-E | Dry Season Neap Ebb Tdie |
| D-N-F | Dry Season Neap Flood Tide |
| W-S-E | Wet Season Spring Ebb Tide |
| W-S-F | Wet Season Spring Flood Tide |
| W-N-E | Wet Season Neap Ebb Tdie |
| W-N-F | Wet Season Neap Flood Tide |

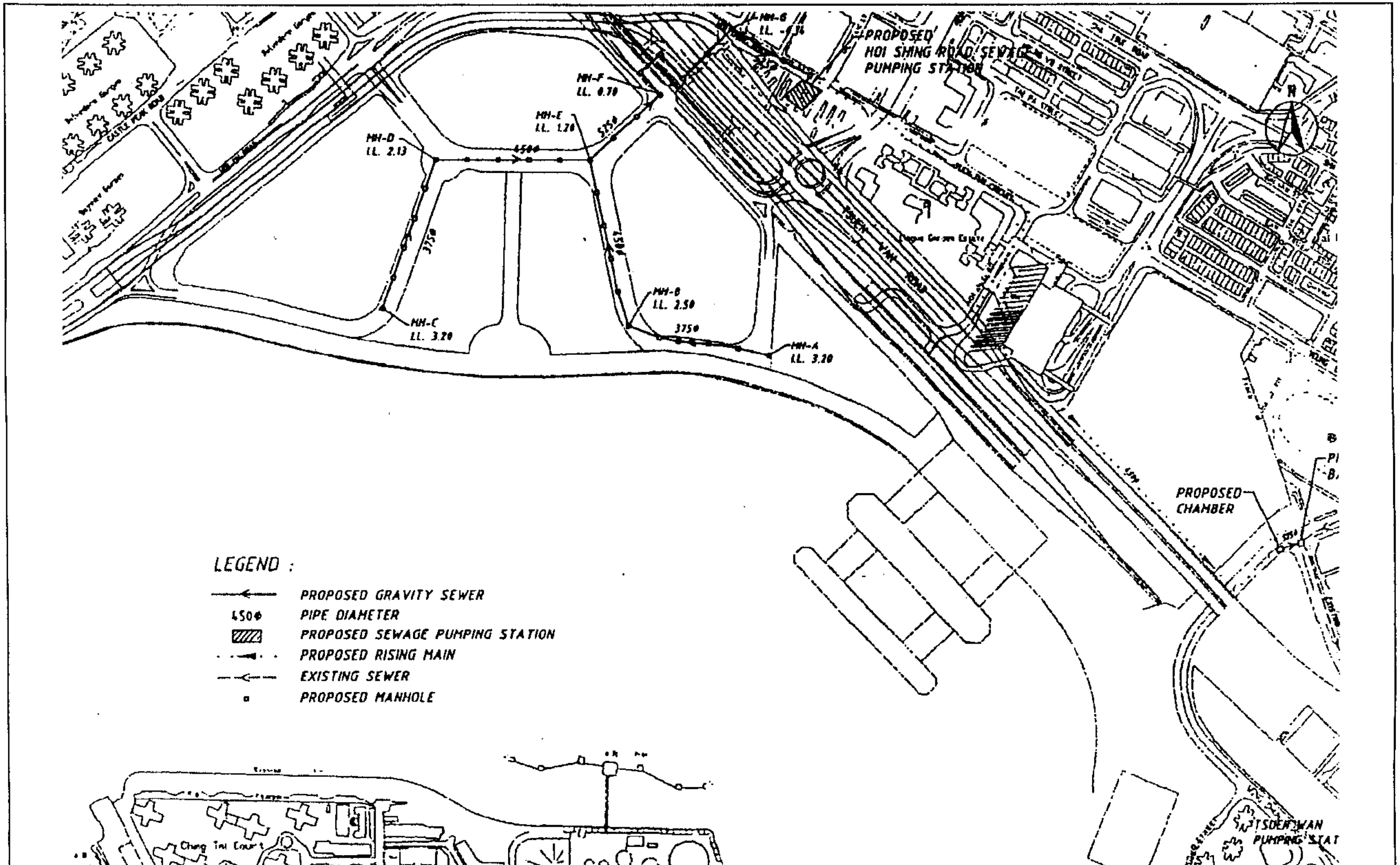
TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

PERCENTAGE CHANGE IN TIDALVOLUME DUE TO TWBFR

FIGURE 7.8

SCALE NOT TO SCALE

B010\xl\hwr-data.xls/graph




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

PROPOSED SEWERAGE SYSTEM

FIGURE 7.9

SCALE NOT TO SCALE

# 8 SOLID WASTE AND CONTAMINATION ASSESSMENT

## 8.1 Waste Management (Construction Phase)

*General Site Wastes*

8.1.1 Materials and equipment used on site will produce packaging and container wastes. Measures should include provision of a collection area where waste can be stored and loaded prior to removal from site. An enclosed and covered area is preferred to reduce the occurrence of 'wind blow' light material. If an open area is unavoidable for the storage or loading/unloading of wastes, then the area should be bunded and all the polluted surface run-off collected within this area should be diverted into sewers.

8.1.2 Materials classified as chemical wastes will need special handling and storage arrangements before removal for appropriate treatment at the chemical waste treatment facility (CWTF) at Tsing Yi. Wherever possible opportunities should be taken to reuse and recycle materials.

*Workforce wastes*

8.1.3 Throughout construction, the workforce will generate general refuse, comprising food scraps, paper, empty containers etc.

8.1.4 Rapid and effective collection of site wastes will be required to prevent waste materials being blown around by wind, flushed or leached into the marine environment. Suitable collection sites around site offices, service buildings and canteen will be required. It is recommended that for environmental hygiene reasons putrescible wastes are not stored for a period exceeding 48 hours, however, removal every 24 hours is preferable. The putrescible waste will not be suitable for incorporation into any reclamation works.

*Maintenance wastes*

8.1.5 Construction plant and equipment will require regular maintenance and servicing which will generate waste. Substances generated are likely to include some chemical wastes such as cleaning fluids, solvents, lubrication oil and fuel.

8.1.6 Vehicle and equipment maintenance activities will involve the use of a variety of chemicals, oil and lubricants, including heavy duty cleaners, organic solvents, degreasers, brake fluids, battery acid and soldering fluids. The cumulative effect of a potentially large number of small spillages during maintenance operations by faulty equipment, accidents, carelessness and deliberate discharge to drain may be significant.

8.1.7 The service shop and minor maintenance facility should be located on hard standings within a bunded area, sumps and oil interceptors should be provided. Maintenance of vehicles and equipment involving activities with potential for leakages and spillage should only be undertaken with the areas appropriately equipped to control these discharges.

*Infrastructure wastes*

8.1.8 On completion of reclamation and construction works, site buildings and facilities will be demolished and removed from site including many site features which could be dismantled for reuse and recycling.

8.1.9 Demobilisation of infrastructure and site clearance will generate construction wastes, scrap material residues which will require disposal. Certain elements may need to be disposed to landfill or public dump but recyclable materials would be salvaged for reuse, inert waste utilised as fill.

*Good Site Practice*

8.1.10 It is not expected that significant waste management related impacts would arise, provided good site practice (GSP) is adhered to. Recommendations for GSP for wastes include:

- 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 site;
- Training of site personnel in proper waste management and chemical handling procedures;
- The reuse and recycling of materials wherever possible;
- Plan and stock construction materials carefully to minimise amount of waste generated and avoid unnecessary generation of waste;
- 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;
- 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.

## 8.2 Wastes Management (Operational Phase)

8.2.1 As outlined in the Master Development Plan, the future development will accommodate a population of 29,288 in private and public housings. There will also be 8,104 employees working in the area. The estimated quantity of wastes generated from the development in 2011 will be 43,425 kg/day of which 31,361 kg/day will be from residential sector and 12,064 kg/day from the commercial/industrial sector[5].

8.2.2 A refuse collection point (RCP) is required for the development to serve the needs of population over 20,000 as outlined in the HKPSG. Key issues for the RCP are summarized below:

- Waste reception and transfer facilities should be sited so that any adjacent development is well buffered;
- Adequate control measures should be provided to minimize impacts such as odour, leachate and noise;
- The location and design should aim to minimize nuisance to the public and people living and working nearby; and
- It should also be sited so as to minimize disruption to traffic or the creation of traffic safety hazards.

## 8.3 Contamination

*Land Contamination*

8.3.1 The study area is mostly marine. Only a small portion of land on the northeast and northwest fringes of the site was reclaimed in the 1980's to accommodate Tsuen Wan Road, Road 2/1 and Tsuen Wan PCWA. Land on the western side mainly supports roads and pedestrian walkways, while that on the eastern side supports a PCWA.

8.3.2 The TWPCWA was formed on reclamation in the 1980's. It is 670 m long and occupies an area of 20,100 $m^2$. The average width of backup area is 30 m. According to 1994 Marine Department statistics the throughput in cargo at the TWPCWA was 3,970 tonnes per metre of sea frontage.

8.3.3 The existing PCWA is divided into 84 berths, each of 8 m length. The cargo mix in terms of percentage length of seafront is roughly 34% container cargo, 56% general cargo, 5% scrap iron and 5% plywood. Handling of chemical/hazardous goods and wastes is not allowed in the PCWA.

8.3.4 A site inspection was carried out in July 1995 when the project commenced. The PCWA is concrete paved with no bare soil surface. There was no major cracks and no discolouration was observed. Also, there was no visual sign of oil spills or chemical leakage. Condition during the site visit is given in **Figure 8.1**. Marine Department has also confirmed that there is no spillage record pertaining to the PCWA.

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5 Data from Monitoring of Solid Waste in Hong Kong 1995. Domestic wastes generation in 1995 was about 1.01 kg/person/day with an average rate of increase in waste generation was 2.8% per annum over the past fifteen years. Commercial & industrial wastes generation in 1995 was 0.88 kg/person/day with an average rate of 3.78% increase per annum.

8.3.5 As the activities of the PCWA are unlikely to cause significant sources of contamination, and the site inspection confirmed that there was no sign of land contamination, land contamination is not considered as an issue or a constraint for the TWBFR development.

*Marine Sediment Contamination*

8.3.6 Heavy metals concentrations in sediment are currently adopted in the EPD's Technical Circular No. (TC) No 1-1-92 "*Classification of Dredged Sediments for Marine Disposal*" as the parameters for classifications of contaminated sediments. The results as compared with the classification systems are presented in **Table 8.1**. The location plan of vibrocore is given in **Figure 8.2**.

8.3.7 The full report of the laboratory tests is presented in the "Laboratory Testing" report (no. GE 96020001) prepared by Geotechnics & Concrete Engineering (HK) Ltd on 3rd February 1996 under contract GE/93/10 and works order no. GE/93/10.93 and is given in **Appendix D**.

8.3.8 All surface sediment samples (0.0 - 0.1 m deep) fell into Class C "highly contaminated material" in which six of seven metals (namely Cr, Cu, Ni, Pb, Zn and Cd) exceeded the relevant Class C limits for most cases.

8.3.9 The extent of Class C sediments was found to reach 2 to 3 m deep for vibrocores VC1 to VC8. Vibrocores VC9 and VC10 located away from the shore showed contamination reaching Class C only occurred in the surface layer. There was a decrease in the level of metal contamination from surface to deeper sediments.

8.3.10 There are no existing local standards on PCBs and PAH concentrations in marine sediments. PCB concentration in the composite sediment samples were all less than 100 $\mu$g/kg. PAH concentration in the composite sediment samples were all less than 0.3 mg/kg.

8.3.11 It was recommended previously in the Working Paper on *Reclamation Method and Seawall Construction Options* that a drained reclamation would be carried out by leaving the very soft to soft marine clays and other soft clays in place with vertical band drains installed within the reclamation area, while only a minimal amount of dredging would be required for the seawall foundation. This recommendation is generally supported by the results of this contaminated sediment study as Class C highly contaminated sediments were found in the inner part of the bay. Dredging would be confined to areas beneath the seawall foundation and it would be located near to vibrocores VC 7, VC 9 and VC 10 for which contamination was generally confined to surface sediments only.

8.3.12 Estimated volumes of dredged sediment are summarised in **Table 8.2**. Total volume to be dredged is estimated to be about 0.2 $Mm^3$, of which about 0.04 $Mm^3$ is classified as Class C seriously contaminated sediment. These dredged materials will be dumped on site.

8.3.13 **Figure 8.3** shows a proposed typical stratification of fill types for the reclamation. *In-situ* marine clay will be capped by a 2-metre layer of sand fill before the dredged mud is dumped within the site. The dredged material placed in the site will be isolated from the environment by another 2-metre layer of sand capping. The space above this sand cap will then be used as public dump. By this arrangement, the amount of contaminated mud disposed in the site will be permanently isolated from the environment and contained.

8.3.14 In addition, highly contaminated material identified as Class C must be dredged and transported with great care and which must be permanently isolated from the environment, and which should not be dumped in the gazetted marine disposal grounds.

**Table 8.1 Classification of Contaminated Sediments Analysis Results**

| Vibrocore Location | Depth of Sampling Below Seabed (m) | Contamination Classification Based on Heavy Metal Analysis | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Cr | Cu | Ni | Pb | Zn | Hg | Cd | Overall Classification |
| VC1 | 0.0 - 0.1 | C | C | C | C | C | A | C | C |
| | 0.9 - 1.0 | C | C | C | C | C | A | C | C |
| | 1.9 - 2.0 | C | B | A | C | C | A | C | C |
| | 2.9 - 3.0 | A | A | A | A | A | A | A | A |
| | 5.9 - 6.0 | A | A | A | A | A | A | A | A |
| | 6.9 - 7.0 | A | A | A | A | A | A | A | A |
| VC2 | 0.0 - 0.1 | C | C | C | C | C | A | C | C |
| | 0.9 - 1.0 | C | C | C | C | C | A | B | C |
| | 1.9 - 2.0 | B | A | A | C | A | A | A | C |
| | 2.9 - 3.0 | C | B | A | C | C | A | C | C |
| | 5.9 - 6.0 | A | A | A | A | A | A | A | A |
| | 8.9 - 9.0 | A | A | A | C | A | A | A | C |
| | 11.4 - 11.5 | A | A | A | C | B | A | A | C |
| VC3 | 0.0 - 0.1 | C | C | C | C | C | B | C | C |
| | 0.9 - 1.0 | C | C | A | C | C | C | C | C |
| | 1.9 - 2.0 | A | A | A | C | A | A | A | C |
| | 2.9 - 3.0 | A | A | A | A | A | A | A | A |
| | 5.9 - 6.0 | A | A | A | A | A | A | A | A |
| | 8.9 - 9.0 | A | A | A | C | A | A | A | C |
| VC4 | 0.0 - 0.1 | C | C | C | C | C | A | C | C |
| | 0.9 - 1.0 | A | C | A | C | A | A | A | C |
| | 1.9 - 2.0 | C | C | C | C | C | A | B | C |
| | 2.9 - 3.0 | A | A | A | A | A | A | A | A |
| | 5.9 - 6.0 | A | A | A | A | A | A | A | A |
| | 8.9 - 9.0 | A | A | A | A | A | A | A | A |

**Table 8.1 Classification of Contaminated Sediments Analysis Results (Continued)**

| Vibrocore Location | Depth of Sampling Below Seabed (m) | Contamination Classification Based on Heavy Metal Analysis | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Cr | Cu | Ni | Pb | Zn | Hg | Cd | Overall Classification |
| VC5 | 0.0 - 0.1 | C | C | C | A | C | A | B | C |
| | 0.9 - 1.0 | C | C | C | C | C | A | C | C |
| | 1.9 - 2.0 | C | C | C | C | C | A | B | C |
| | 2.9 - 3.0 | C | C | A | C | C | C | C | C |
| | 5.9 - 6.0 | A | A | A | A | A | A | A | A |
| | 8.9 - 9.0 | A | A | A | A | C | A | A | C |
| VC6 | 0.0 - 0.1 | C | C | C | A | B | A | A | C |
| | 0.9 - 1.0 | C | C | C | B | C | A | C | C |
| | 1.9 - 2.0 | C | C | C | C | C | A | C | C |
| | 2.9 - 3.0 | C | C | A | A | A | A | A | C |
| | 5.9 - 6.0 | A | A | A | B | A | A | A | B |
| VC7 | 0.0 - 0.1 | C | C | C | B | C | A | B | C |
| | 0.9 - 1.0 | A | A | A | A | A | A | A | A |
| | 1.9 - 2.0 | A | A | A | A | A | A | A | A |
| | 2.9 - 3.0 | A | A | A | C | A | A | A | C |
| | 5.9 - 6.0 | A | A | A | A | A | A | A | A |
| VC8 | 0.0 - 0.1 | C | C | C | C | C | A | C | C |
| | 0.9 - 1.0 | C | C | C | C | C | A | C | C |
| | 1.9 - 2.0 | C | C | C | C | C | A | B | C |
| | 2.9 - 3.0 | A | A | A | A | A | A | A | A |
| | 5.9 - 6.0 | A | A | A | A | A | A | A | A |
| | 8.9 - 9.0 | A | A | A | A | A | A | A | A |
| VC9 | 0.0 - 0.1 | A | A | A | C | A | A | A | C |
| | 0.9 - 1.0 | A | A | A | A | A | A | A | A |
| | 1.9 - 2.0 | A | A | A | A | A | A | A | A |
| | 2.9 - 3.0 | A | A | A | A | A | A | A | A |
| | 5.9 - 6.0 | A | A | A | B | A | A | A | B |

**Table 8.1 Classification of Contaminated Sediments Analysis Results (Continued)**

| Vibrocore Location | Depth of Sampling Below Seabed (m) | Contamination Classification Based on Heavy Metal Analysis | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Cr | Cu | Ni | Pb | Zn | Hg | Cd | Overall Classification |
| VC10 | 0.0 - 0.1 | C | C | C | C | C | A | B | C |
| | 0.9 - 1.0 | A | A | A | A | A | A | A | A |
| | 1.9 - 2.0 | A | A | A | A | A | A | A | A |
| | 2.9 - 3.0 | A | A | A | B | A | A | A | B |
| | 5.9 - 6.0 | A | A | A | B | A | A | A | B |

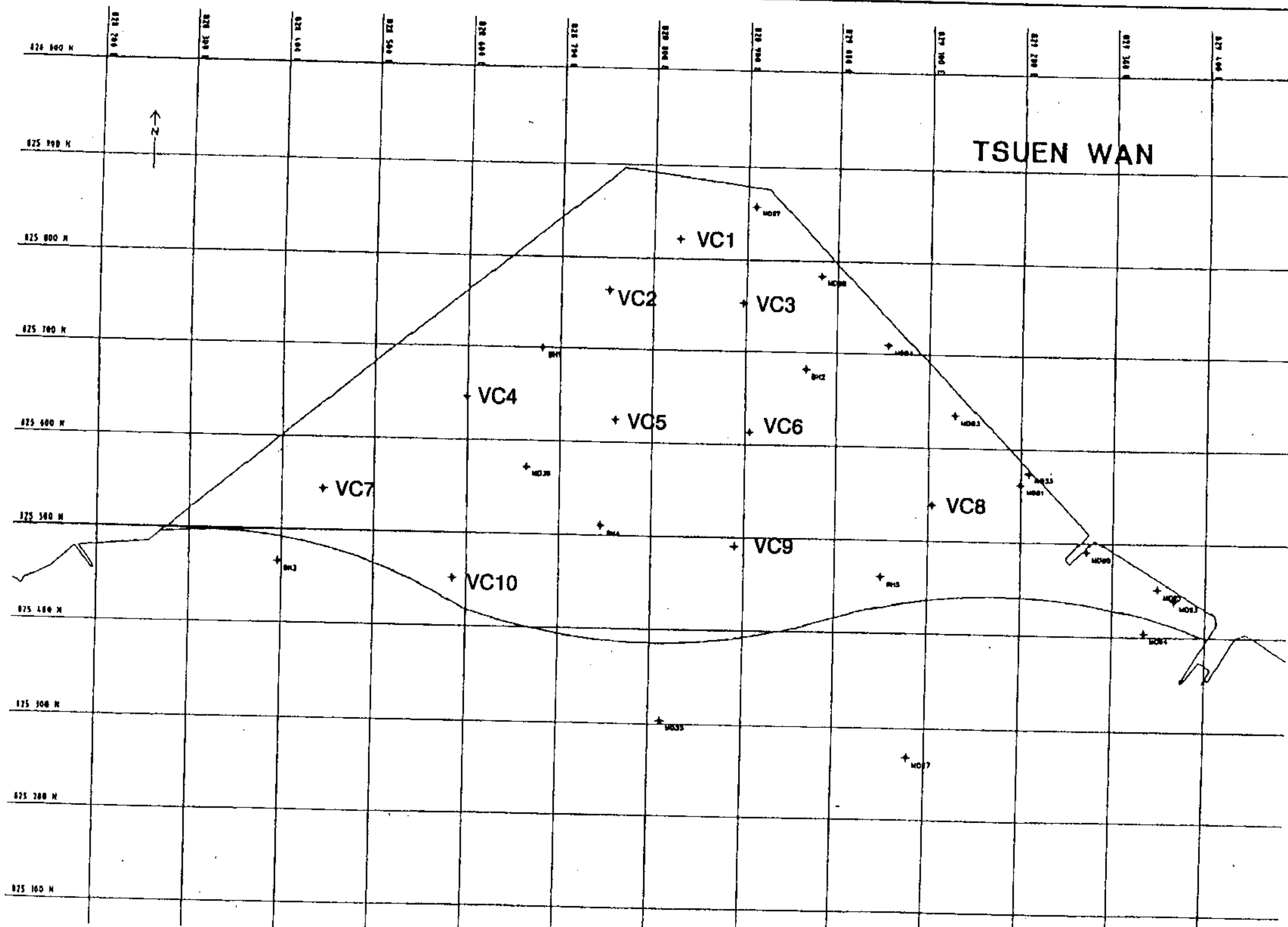
**Table 8.2 Estimated Volume of Dredged Sediment**

| Class of Contamination | Description | Approximate Volume ($Mm^3$) |
|---|---|---|
| A | Uncontaminated | 0.112 |
| B | Moderately Contaminated | 0.04 |
| C | Seriously Contaminated | 0.042 |
| Estimated Total Dredged Sediment Volume | | 0.194 $Mm^3$ |

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

TSUEN WAN PUBLIC CARGO WORKING AREA

| | |
|---|---|
| FIGURE | 8.1 |
| SCALE | NOT TO SCALE |




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

LOCATION PLAN OF VIBROCORE

FIGURE 8.2

SCALE NOT TO SCALE

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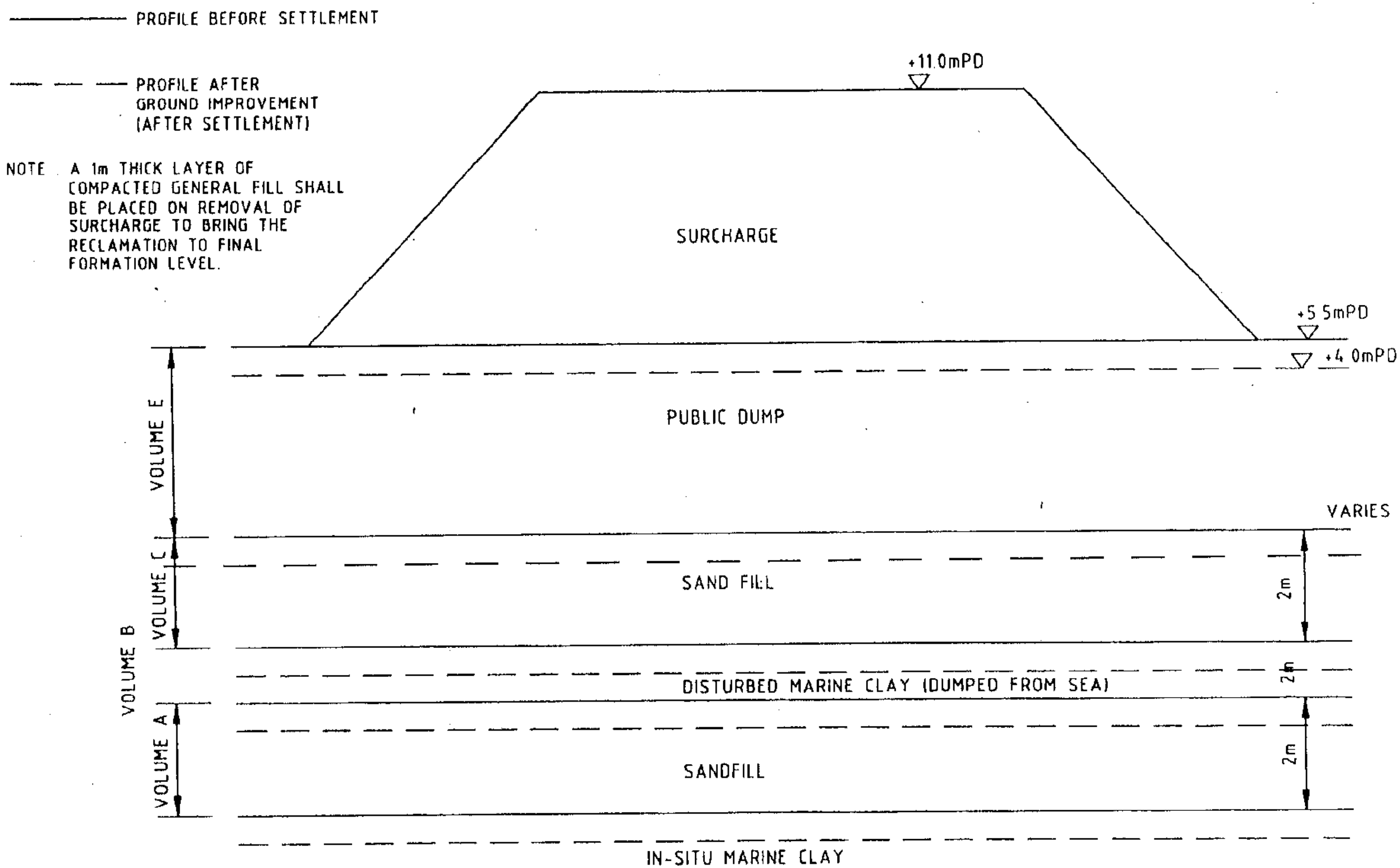



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

PROPOSED TYPICAL TRATIFICATION OF FILLTYPES DURING RECLAMATION

FIGURE 8.3

SCALE NOT TO SCALE

# 9 RISK ASSESSMENT

## 9.1 Individual Risk Considerations

9.1.1 The individual risk results presented in the Castle Peak Road Report[6] indicate that the ranges to the $1.0 \times 10^{-6}$ and $1.0 \times 10^{-7}$ contours are about 350 m and 500 m respectively. The iso-risk contour is reproduced in **Figure 9.1**. Based on the figure, it is clear that the level of off-site risk within the proposed reclamation area of Tsuen Wan Bay (which is no closer than 500 m to the YKT works) will be well below the Individual Risk Guideline of $1.0 \times 10^{-5}$ per year.

9.1.2 In short, the level of individual risk within the development area will be very low (since the likelihood of becoming a fatality will be less than 1 chance in 10 million per year) and will be deemed acceptable within the context of the Individual Risk Guideline.

## 9.2 Societal Risk Considerations

*Overview*

9.2.1 Although societal risk results are presented in the Castle Peak Road Report, these relate only to the 'population at risk' on the Castle Peak Road. It is therefore necessary to recalculate the societal risks by combining the results of the hazard and consequence analyses presented in the Castle Peak Road Report with the 'population at risk' for Tsuen Wan Bay (as derived in Section 2.4).

*Results of Hazard and Consequence Analyses*

9.2.2 No part of the Tsuen Wan Bay development will be within 500 m of the chlorine building of the YKT works. The results in the Castle Peak Road Report indicate that users of the area will only be at risk from continuous chlorine releases of 1.5 kg/sec or more, or instantaneous releases of 1t or more. The likelihoods of such events and the associated maximum hazard ranges (i.e. the ranges to which fatalities may occur) are summarised[7] in **Table 9.1**.

---

6 See Section 6.1 and Figure 6.1 of the **Feasibility Study for Castle Peak Road Improvements - Hazard Assessment** Report (referred as the Castle Peak Road Report).

7 The information presented is based on Tables 5.1, 5.3 and 5.4 of the Castle Peak Road Report.

*Calculation of Societal Risks*

9.2.3 For each of the events listed in **Table 9.1** (for example, a 1.8 kg/sec release by day), the resultant fatalities within Tsuen Wan Bay were calculated[8] under two representative weather categories based on the variation of chlorine concentrations within the dispersing chlorine plume, the relationship between concentration and fatality probability (assuming a 10 minute exposure), the appropriate day/night population distribution and allowing for escape probabilities.

**Table 9.1 Chlorine Releases of Concern**

| Release Rate/ Size | Likelihood (per year) | | Maximum Hazard Range* (m) |
|---|---|---|---|
| | by Day | by Night | |
| 1.5 kg/sec | $2.3 \times 10^{-5}$ | $1.2 \times 10^{-5}$ | 565 |
| 1.8 kg/sec | $3.9 \times 10^{-6}$ | $3.6 \times 10^{-6}$ | 630 |
| 3.1 kg/sec | $1.8 \times 10^{-6}$ | $6.0 \times 10^{-7}$ | 890 |
| 1t | $2.1 \times 10^{-6}$ | $1.9 \times 10^{-6}$ | 740 |
| 2t | $1.1 \times 10^{-6}$ | $1.1 \times 10^{-6}$ | 930 |
| 5t | $2.7 \times 10^{-7}$ | $2.7 \times 10^{-7}$ | 1400 |
| All* | $3.2 \times 10^{-5}$ | $2.0 \times 10^{-5}$ | 1400 |

Note* : The entry "All" refers to 'the sum of the likelihoods of all the above entries'. The "maximum hazard range' represents the range of 3% fatalities under adverse weather conditions.

9.2.4 For each event, the frequency was modified to account for the probabilities of the different weather categories and for the probability that the wind would be blowing from the YKT works towards Tsuen Wan Bay[9].

9.2.5 It should be noted that no specific allowance was made for the benefits of being indoors - in other words, the 'true' risks are likely to be lower than the 'assessed' risks.

9.2.6 From the above, it can be seen that it is then possible to generate a series of 'fN pairs' for each combination of release size, time of release and weather category. These pairs were then combined to generate the overall societal risks as presented in **Table 9.2** and **Figure 9.2**. As can be seen from **Table 9.2** and **Figure 9.2**, the societal risks are very low and well within the acceptable region prescribed by the Societal Risk Guidelines.

8 The calculations were performed using the same in-house integrated risk computer models utilised for the Castle Peak Road Report. The methodology used has been adopted in previous studies which have been reviewed by EPD. Further details of the assessment will be given in the standalone Hazard Assessment Report for this study.

9 A probability of 0.05 (i.e. 5%) was used where this was intended to account for any topographical effects on the dispersion of chlorine in an easterly direction (as discussed in Section 5.6 of the YKT Report).

**Table 9.2 Societal Risks (fN Data)**

| Likelihood of N or more Fatalities (per year) | Number of Fatalities, N |
|---|---|
| $2.6 \times 10^{-7}$ | 1 |
| $1.6 \times 10^{-7}$ | 5 |
| $9.5 \times 10^{-8}$ | 10 |
| $2.7 \times 10^{-8}$ | 50 |
| $1.4 \times 10^{-8}$ | 100 |
| $<1.0 \times 10^{-9}$ | 500 |

9.2.7 The societal risk figures presented in **Table 9.2** may also be compared with the overall societal risks associated with the YKT works which were originally calculated in the 1990 Hazard Assessment prepared by WSAtkins. By comparison with the data presented in Table 7.23 of the Atkins report (1990) (for the "Yau Kom Tau (Ultimate Stage) with Modifications" and "Planned Population"), it can be seen that the societal risks associated with the Tsuen Wan Bay development will increase the overall societal risks by about 3%.

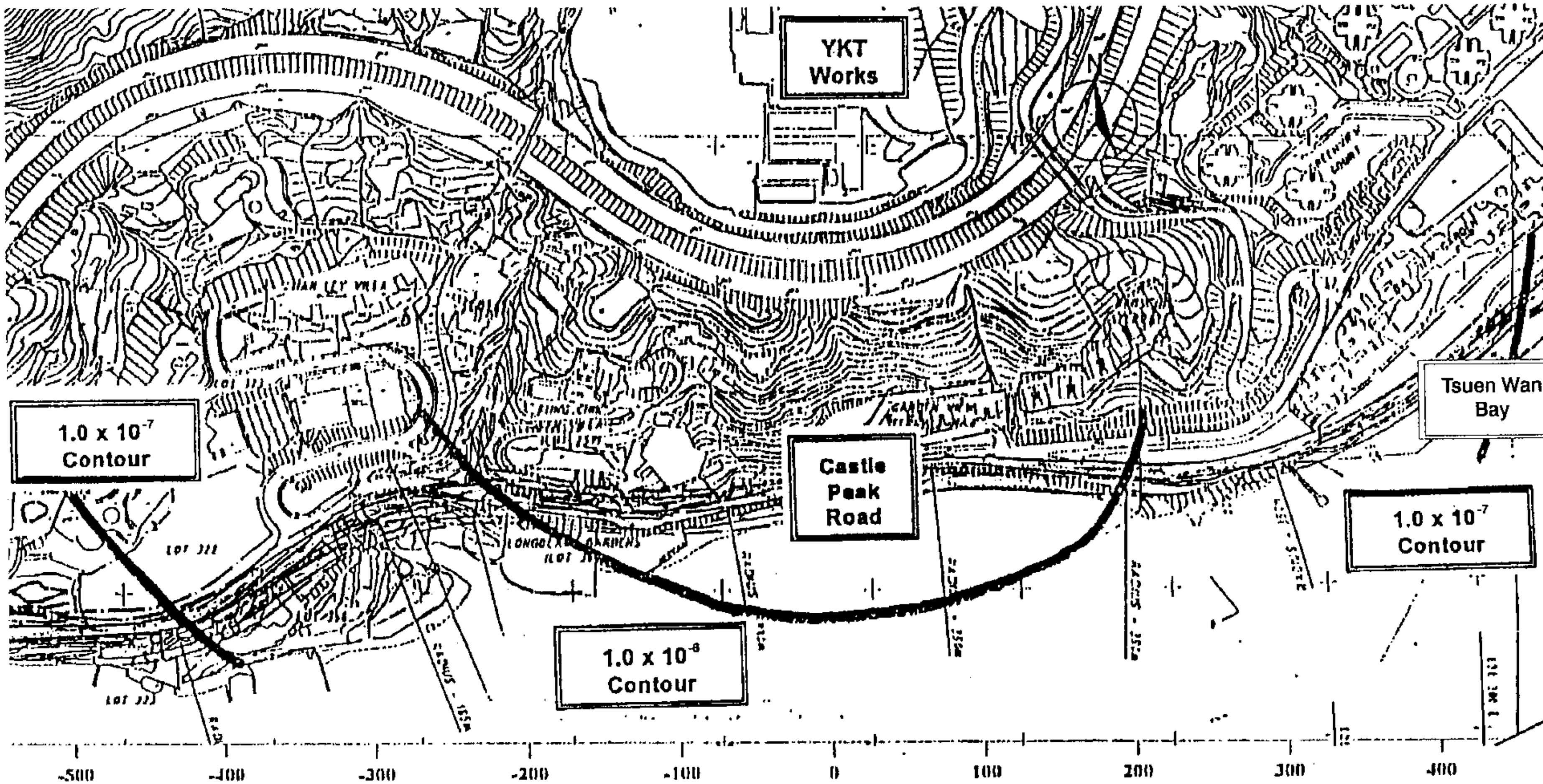
9.2.8 In summary, the societal risks associated with the proposed development are not considered to be significant in terms of both absolute values (as well within the 'acceptable' region of the Societal Risk Guidelines) and relative values (as only contribute 3% to the overall societal risks associated with the YKT works).

## 9.3 Implications of Results

9.3.1 The level of individual risk was estimated to be below 1 chance in 10 million per year (or, mathematically, $1 \times 10^{-7}$ per year) of being fatally injured as a result of a chlorine release from the YKT works. This is 100 times lower than the 'acceptable' risk level set by the Individual Risk Guideline.

9.3.2 **Figure 9.2** indicated that the associated societal risks are well within the 'acceptable' region of the Societal Risk Guidelines.

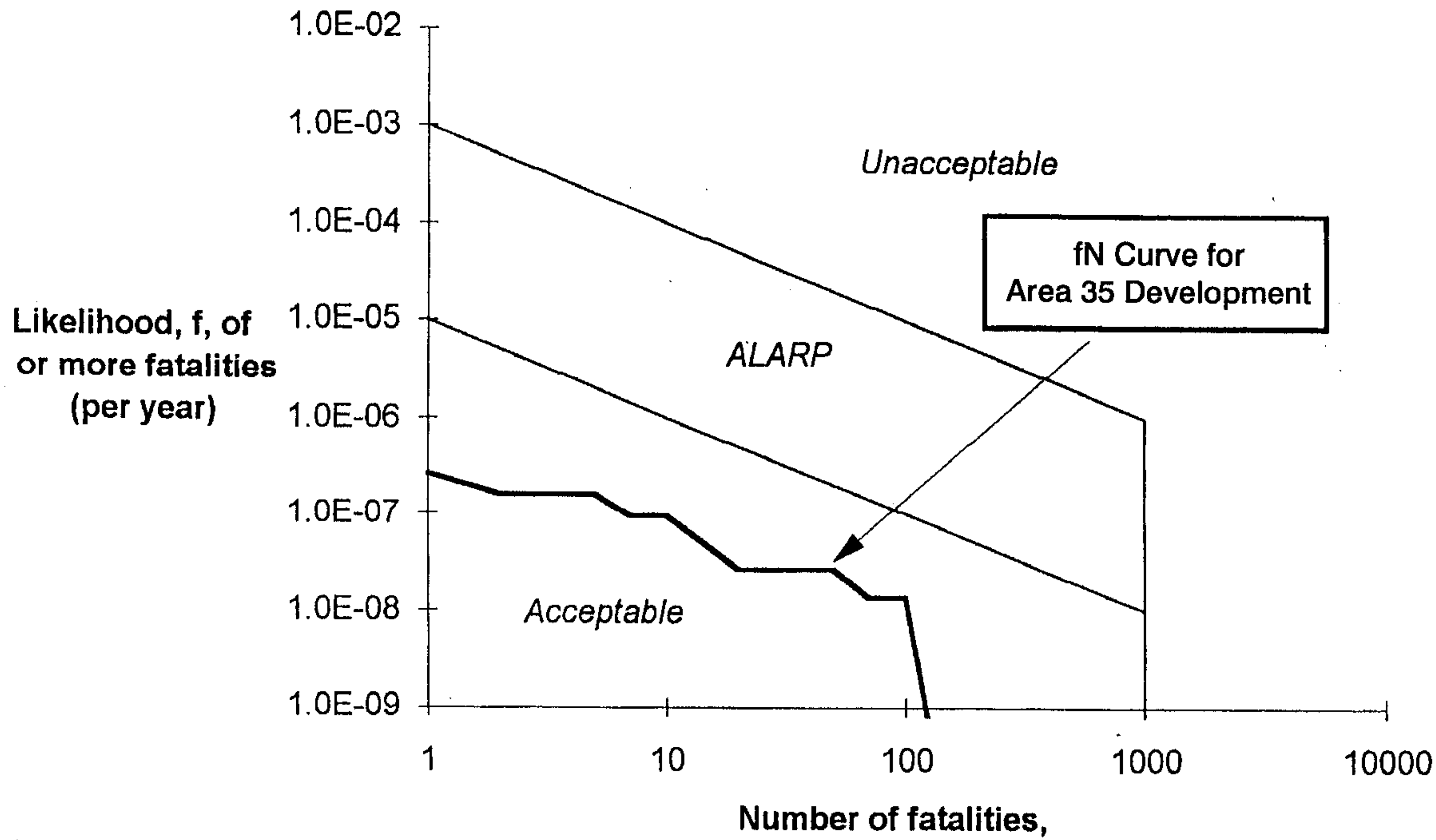
9.3.3 Nevertheless, it is important to note that, in developing the MDP, features have been incorporated which mitigate the societal risks. In particular, the provision of an open space/park in Planning Area 101C at the western edge of the development area provides additional separation between the YKT works and the nearest centres of high population density on the development site. Furthermore, the highest population densities associated with the public rental housing have been located over 1 km away from the YKT works on the eastern side of the development area (in Planning Area 104A).




NOTE: THE FIGURE IS EXTRACTED FROM FIGURE 6.1 OF THE FEASIBILITY STUDY FOR CASTLE PEAK ROAD IMPROVEMENTS - HAZARD ASSESSMENT REPORT

| | | |
|---|---|---|
| TSUEN WAN BAY FURTHER RECLAMATION, AREA35<br>ISO-RISK CONTOURS | FIGURE | 9.1 |
| | SCALE | NOT TO SCALE |

B010




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

fN CURVE FOR TSUEN WAN BAY (AREA 35)

| | |
|---|---|
| FIGURE | 9.2 |
| SCALE | NOT TO SCALE |

# 10 CONCLUSIONS AND RECOMMENDATIONS

The environmental impacts associated with the project and the proposed mitigation measures are summarised in the following sections. An implementation schedule of the proposed mitigation measures is attached in **Appendix F**.

## 10.1 Noise

*Construction Noise - Impact Summary*

10.1.1 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.

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

*Construction Noise - Mitigation Proposals*

10.1.3 The contractor should locate particularly noisy equipment and activities as far from sensitive receivers as is practical.

10.1.4 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.

10.1.5 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 such as those indicated in **Tables 5.3 - 5.6** of this report. With the recommended quiet power equipment, construction noise levels at all NSRs except CN11 (Ng Kwok Wai Memorial Kindergarten) during examination periods would satisfy the day time construction noise criteria.

10.1.6 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.

10.1.7 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.

10.1.8 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.

10.1.9 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.

*Operational Noise*

10.1.10 The study area includes existing and planned residential areas, and new schools proposed for the development. These are all considered noise sensitive receivers under the Noise Control Ordinance and the Hong Kong Planning Standards and Guidelines. Noise assessment has been performed using predicted 2011 traffic data for more than 150 representative receivers to cover the whole study area.

10.1.11 Major road noise sources in the area are traffic along the elevated Tsuen Wan Road, Hoi On Road and Hoi Hing Road. In anticipation of the high level of traffic noise on these major roads, significant setbacks from proposed buildings to the carriageways have been incorporated into the planning areas in conjunction with other development requirements. In particular, the large setback from Hoi On Road in Areas 101 and 102 is predicted to be effective in reducing noise impacts on residential facades from this major road. Exceedance by 1-3 dB(A) has been predicted only for buildings closest to Hoi On Road (near Road D1). By extending the podium closer to Hoi On Road and Road D1 to enhance the shielding and relocating the openable window to the facade with an acute angle of exposure to road traffic, most of the affected facades are predicted with noise levels below the HKPSG standards.

10.1.12 Similarly, residential buildings adjacent to Hoi Hing Road and Tsuen Wan Road in Areas 102 and 104 are predicted to have noise levels in excess of the HKPSG limit by 9 dB(A) at selected facades. In fact, predicted noise levels due to the existing Tsuen Wan Road alone exceed 70 dB(A). Noise barriers on new ramps would be ineffective in reducing the noise levels at these facades to meet the HKPSG standards since contribution from these new ramps to the cumulative noise level is predicted to be less than 1 dB(A). There is no current policy to apply retroactive mitigation to existing roads. Nevertheless, direct mitigation measures on Tsuen Wan Road would be more effective in resolving the potential noise problems, and thus should be considered in any future study that aims to upgrade Tsuen Wan Road.

10.1.13 Although direct mitigation measures cannot be applied on Tsuen Wan Road, other indirect measures have been recommended to minimise the noise impacts to Areas 102 and 104. These includes extended podia, use of boundary walls and reorientation of openable windows to the facade with an acute angle of exposure to road traffic.

10.1.14 Planned district distributor roads and local roads are predicted to have moderate traffic flows, but their close proximity to some of the proposed residential dwellings and schools have led to slight exceedances of the HKPSG at selected facades. For most of these affected facades, window reorientation and/or boundary walls of 3m height are found to be sufficient to resolve the predicted non-compliance.

10.1.15 Slight exceedances of HKPSG noise standards at schools adjacent to the planned district distributor and local roads were also predicted. Boundary walls of 3m height along the site boundaries were found to be effective in resolving the predicted non-compliance at most schools.

10.1.16 Noise impacts on the existing receivers have also been investigated. The predicted 2011 results show that facades within 20 m from the road-edge of Hoi On Road in Bayview Garden and Belvedere Garden Phase 3 are exposed to noise levels of 70 dB(A) or higher. With the provision of canopy type barriers (5m tall + 2m overhang) on the improved sections of Hoi On Road, most of the dwellings in Bayview Garden were predicted with noise levels in compliance with the HKPSG standards and none of the affected units would meet the eligibility criteria for indirect technical remedies. Similarly, with the provision of canopy type barriers (5m tall + 3m overhang) along the eastbound carriageway of the new ramps associated with the tunnel bypass, none of the affected units in Clague Garden Estate would be eligible for indirect technical remedies.

10.1.17 Direct mitigation measures for existing NSRs were considered and evaluated where appropriate in the assessment. Upon exhaust of direct mitigation measures, the results of mitigated scenario showed that there would still be residual impacts at the NSRs which were mainly contributed from existing roads.

*Industrial Noise*

10.1.18 Projection of industrial noise levels from existing industrial building north to Ho Shing Road revealed that the north-east facing facades of the residential blocks of the PSPS and the Area 104A would meet the criteria. Hence, additional noise mitigation is not required.

## 10.2 Air Quality

*Construction phase*

10.2.1 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.

*Operational phase*

10.2.2 Results of the air quality assessment on traffic emissions showed that there will be no exceedance of the AQO at the representative ASRs in year 2011. In this assessment, it was assumed that a ventilation system will be provided for the tunnel connecting Hoi On Road and Tsuen Wan Road. The modelling results showed that the air quality will comply with the AQO provided that the ventilation system can discharge up to 70% of the traffic emission of the tunnel into the atmosphere through the ventilation shaft so that the pollutants will be dispersed and diluted before reaching the ASRs. To minimise the air quality impact, a buffer distance of 100 m is suggested, which is about the maximum separation between the ASRs and the ventilation shaft.

10.2.3 Results of the air quality assessment on stack emissions showed that there will be no exceedance of the AQO at the future ASRs in the site. The results indicated that major industrial emission impacts on the Development Area will come from the stacks located to the north of the site at Kong Nam Industrial Building, and to the north-east of the site at the industrial buildings along Chai Wan Kok Street. A height restriction of 90 m on development on a small area in Area 102 B is recommended. Since Area 102B, which would be the worst area affected by the stack emissions, has been zoned as open space, there would be no ASRs adversely affected by potential plume impingement.

*Mitigation Proposals*

10.2.4 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.

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

10.2.6 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.

10.2.7 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.

10.2.8 In the unlikely event that suction dredging is used, mitigation measures for odour 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.

## 10.3 Water Quality

*Construction phase*

10.3.1 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.

10.3.2 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.

10.3.3 Polluted runoff during land based development works on the reclamation would be unlikely to pose a great threat to the water quality provided that proper mitigation measures are provided and good site practices are implemented.

10.3.4 Dredging and filling impacts would be confined after a submerged seawall is built at the southern 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.

10.3.5 With the implementation of appropriate mitigation measures (use of closed grabs and silt curtains), the problem can be mitigated to an acceptable level provided that works are carried out in the dry season as planned. In case the works are carried out in the wet season, predicted impacts are much higher and 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. With the implementation of the above measures, water quality impacts at the intakes would likely be acceptable even if works are carried out in the wet season.

*Operational phase*

10.3.6 A primary concern of reclamation would be the effect on water flow. The TELEMAC 3D tidal flow model was used to predict changes in flow pattern, and hence the tidal discharge volume. Flow across major channels was examined and it is concluded that reclamation of the TWB would only have observable changes for the tidal flow volume through the Rambler Channel, which is approximately 2% for most situations except for the dry season neap tide, where changes are about 3%. For all other channels in Hong Kong, percentage changes in tidal flow volume are mostly small and less than 1%.

10.3.7 Although there is a predicted reduction of 2-3% in flow volume through the Rambler Channel due to the reclamation, it is expected that water quality in the channel would not deteriorate during the operation phase of the TWB. This is because the reduction of flow would be compensated by the reduction of pollution load into Rambler Channel due to various sewerage improvement schemes in the area and the implementation of the SSDS.

*Sewerage*

10.3.8 As the SMP and SSDS works are programmed to finished ahead of the scheduled development programme for the reclamation area, the sewage from the reclamation area would be discharged to the improved Tsuen Wan sewerage system and treatment will be provided at the Stonecutters Island Sewage Treatment Plant, without the need for the separate treatment facility.

10.3.9 The design sewage flow from the reclamation area is estimated based on the flow factors provided in the DSD Sewerage Manual. The collector sewer in the study area will flow generally south to north by gravity to the proposed pumping station in Hoi Hing Road. From the proposed pumping station a 450 mm diameter rising main is proposed to convey the sewage to Wing Shun Street where a short length of 525 mm diameter gravity sewer will be provided for connection into the existing 2100 mm diameter trunk sewer in Texaco Road. The existing trunk sewer and the Tsuen Wan Pumping Station have been found to have sufficient capacities to receive the sewage flows from the reclamation. Potential septicity problem associated with the long rising main shall be addressed in the detailed design stage.

*Mitigation of Dredging, Filling and Dumping Impacts*

10.3.10 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 Temporary 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; and

- Environmental monitoring should be carried out during dredging, filling and reclamation activities at WSD seawater intake. Monitoring should be arranged in accordance with the Environmental Monitoring & Audit (EM&A) Manual and results should be sent to WSD on daily basis for information. If monitoring results indicate that the reclamation activities caused a significant impact to the sensitive receivers, construction programmes should be scheduled carefully to slow down construction activities (e.g. dredging of seawall foundation and filling of sand blanket would not be carried out concurrently, or to reduce the number of plant) such that water quality at the intake could meet WSD water quality objectives.

10.3.11 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.

10.3.12 Although dredging impacts have been predicted to be acceptable except during a short duration, 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 Temporary 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 the works are carried out in the wet season, 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 plant if possible.

10.3.13 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.

10.3.14 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 shown below:

- 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.

10.3.15 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 Impacts*

10.3.16 To aviod deterioration of water quality resulting from potentially polluted storm runoff into any temporary embayments formed during reclamation, diversion of storm drains should be carried out at early stages. The time and sequence of the flow diversion work should follow the schedule shown in **Figures 7.1 - 7.5**.

10.3.17 Septic tanks or chemical toilets should be used as far as practicable. Grease traps should also be provided for wastewater generated from canteens. 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.

10.3.18 The site 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.

*Other Recommendation*

10.3.19 It is recommended to review the pollution status in storm drains and the effectiveness of the sewerage improvement works by collecting field samples during the detailed design stage of the project, when most sewerage improvement works should have been completed. If this review indicates that pollution in storm drains would be a concern, further consideration can be still given, well in advance of the reclamation, to rectify the situation.

## 10.4 Solid Waste and Contamination

*Solid Waste - Construction Phase*

10.4.1 During the construction phase, wastes generated by construction works are likely to include general site wastes, workforce wastes, maintenances wastes, infrastructure wastes and accidental spillage. **Table 10.1** provides the summary of the handling procedures for the various waste generated. It is not expected to generate significant waste management related impacts, provided good site practice (GSP) is adhered to. Recommendations for GSP for wastes include:

- 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 site;

- Training of site personnel in proper waste management and chemical handling procedures;

- The reuse and recycling of materials wherever possible;

- Provision of sufficient waste disposal points and regular collection for disposal;

- Provision of a transfer facility for storage and containment;

- Separation of chemical wastes for special handling and appropriate treatment at the chemical waste treatment facility;

- 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.

*Solid Waste - Operational Phase*

10.4.2 The estimated quantity of wastes generated from the development in 2011 will be around 43,425 kg/day of which 31,361 kg/day will be from residential sector and 12,064 kg/day from the commercial/industrial sector. A refuse collection point (RCP) is required for the proposed development.

Land Contamination

10.4.3 The only pieces of land inside the study area are the strips of land along the coastline of TWB. The area was reclaimed in 1980's and use for roads and a PCWA thereafter. Due to the nature of activities in the PCWA, it is not expected that land contamination would be an issue and constraint to the TWB development. This was further confirmed during a site inspection where no sign of contamination was observed. Marine Department has also confirmed that there is no spillage record pertaining to the PCWA.

*Marine Mud Contamination*

10.4.4 It was recommended that an undredged reclamation should be carried out by leaving the very soft to soft marine clays and other soft clays in place within the reclamation area. Dredging would be confined to areas beneath the seawall foundation and it would be located near to vibrocores VC 7, VC 9 and VC 10 for which the contamination was generally confined to surface sediments. Estimated dredged volume would be 0.194 $Mm^3$, among which 0.042 $Mm^3$ are classified as Class C contaminated mud.

10.4.5 The undredged option minimise the volume of dredged sediments. These dredged materials will be dumped on site. *In-situ* marine clay will be capped by a 2-metre layer of sand fill before the dredged mud is dumped within the site. The dredged material placed in the site will be isolated from the environment by another 2-metre layer of sand capping. The space above this sand cap will then be used as public fill. By this arrangement, the amount of contaminated mud disposed in the site will be permanently isolated from the environment and contained.

**Table 10.1 Summary of Waste Handling Procedures during Construction Phase**

| Waste Type | Mitigation Measures | |
|---|---|---|
| | Handling | Disposal |
| Site and Infrastructural Waste | Where possible should be re-used on-site | On-site for reclamation |
| | If off-site disposal required, separate into:<br>• Non-inert wastes<br>• Inert wastes: concrete and rubble | Landfill<br>Public dump or reclamation |
| Spoil | Where possible should be re-used on-site | On-site for reclamation |
| | If off-site disposal required, separate waste into:<br>• Contaminated spoil depending upon degree of contamination<br>• Uncontaminated spoil | Landfill, or licensed marine dumping pits (last resource)<br>Public dump or landfill |
| Maintenance and Chemical Wastes | Recycle on-site or by licensed companies<br>Stored on-site within suitable designed containers | -<br>Chemical waste treatment facility |
| | Asbestos<br>Provision of appropriate on-site temporary storage facility where necessary<br>To be removed off-site by registered contractors | Landfill |
| Workforce Wastes | Provide on-site refuse collection facilities<br>Main sewerage or septic tank | Refuse Station for compaction and containerisation and then to landfill<br>Private hygiene company |
| Accidental Spillage | Provide spill prevention, containment and handling facilities | - |

## 10.5 Risk Assessment

10.5.1 The proposals to reclaim and develop Tsuen Wan Bay will lead to the introduction of 30,000 people within 1.5 km of the Yau Kom Tau water treatment works (YKT works) which is a designated Potentially Hazardous Installation (PHI) due to the storage and use of chlorine.

10.5.2 Given that the minimum distance between the YKT works and the proposed development site is 500 m, the Individual Risk Guideline will be complied with. As such, concern is focussed upon the societal risks and the associated Societal Risk Guidelines.

10.5.3 Calculation of the societal risks indicates that they are well within the 'acceptable' region of the Societal Risk Guidelines. The overall societal risks associated with the YKT WTW will be increased by about 3% because of the Tsuen Wan Bay development.

10.5.4 Although the assessed risks are very low, features of the Master Development Plan (MDP) do mitigate the societal risks with particular reference to the provision of a large open space on the western side of the development area (i.e. that closest to the YKT works) and the location of high density public rental housing on the eastern side (i.e that furthest from the YKT works).

## APPENDIX A

## NOISE

This Appendix sets out the supporting information for the noise assessment of this report and is divided into four sections:

A1 Construction Noise
A2 Operational Noise (Noise Impact at Existing NSRs)
A3 Operational Noise (Noise Impact at New NSRs)
A4 Industrial Noise (Field Logs and Calculation Details)

## APPENDIX A1

## CONSTRUCTION NOISE

The following seven attachments are attached to this Appendix A1:

(i) Table A1.1 Distances From Representative Noise Sensitive Receivers to:-Area 35 (General Reclamation Site)

(ii) Table A1.2 Distances From Representative Noise Sensitive Receivers to:- Seawall Construction

(iii) Table A1.3 Distances From Representative Noise Sensitive Receivers to:- Area A

(iv) Table A1.4 Distances From Representative Noise Sensitive Receivers to:- Area C

(v) Table A1.5 Distances From Representative Noise Sensitive Receivers to:- Area D

(vi) Table A1.6 Distances From Representative Noise Sensitive Receivers to:- Area E

(vii) Table A1.7 Distances From Representative Noise Sensitive Receivers to:- Reclamation Roads

Table A1.1 Distances From Represenative Noise Sensitive Receivers to:- Area 35 (General Reclamation Site)

| NSR ID | Description | NSR Location | | | Area 35 | | | Horiz. Dist. (m) | Vert. Dist. (m) | Total Dist. (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Easting | Northing | Elevation | Easting | Northing | Elevation | | | |
| CN1 | Blossum Terrace (low rise residential) | 828097 | 825586 | 50 | 828560 | 825645 | 0 | 467 | 50 | 469 |
| CN2 | Bayview Garden - Block 1 (high rise residential) | 828217 | 825522 | 13 | 828560 | 825645 | 0 | 364 | 13 | 365 |
| CN3 | Bayview Garden - Block 2 (high rise residential) | 828242 | 825556 | 13 | 828560 | 825645 | 0 | 330 | 13 | 330 |
| CN4 | Bayview Garden - Block 3 (high rise residential) | 828270 | 825590 | 13 | 828560 | 825645 | 0 | 295 | 13 | 295 |
| CN5 | Bayview Garden - Block 4 (high rise residential) | 828324 | 825624 | 13 | 828560 | 825645 | 0 | 237 | 13 | 237 |
| CN6 | Bayview Garden - Block 5 (high rise residential) | 828364 | 825643 | 13 | 828560 | 825645 | 0 | 196 | 13 | 196 |
| CN7 | Belvedere Garden Phase 3 - Block 4 (high rise res.) | 828545 | 825792 | 12 | 828560 | 825645 | 0 | 148 | 12 | 148 |
| CN8 | Belvedere Garden Phase 3 - Block 5 (high rise res.) | 828576 | 825818 | 12 | 828560 | 825645 | 0 | 174 | 12 | 174 |
| CN9 | Belvedere Garden Phase 3 - Block 6 (high rise res.) | 828608 | 825843 | 12 | 828560 | 825645 | 0 | 204 | 12 | 204 |
| CN10 | Belvedere Garden Phase 3 - Block 7 (high rise res.) | 828641 | 825869 | 12 | 828560 | 825645 | 0 | 238 | 12 | 238 |
| CN11 | Clague Garden Estate - School | 829305 | 825680 | 5 | 829175 | 825585 | 0 | 116 | 5 | 197 |
| CN12 | Clague Garden Estate - Tower C (high rise res.) | 829424 | 825600 | 5 | 829175 | 825585 | 0 | 249 | 5 | 250 |

Table A1.2 Distances From Represenative Noise Sensitive Receivers to:- Seawall Construction

| NSR ID | Description | NSR Location | | | Seawall | | | Horiz. Dist. (m) | Vert. Dist. (m) | Total Dist. (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Easting | Northing | Elevation | Easting | Northing | Elevation | | | |
| CN1 | Blossum Terrace (low rise residential) | 828097 | 825586 | 50 | 828400 | 825535 | 0 | 307 | 50 | 311 |
| CN2 | Bayview Garden - Block 1 (high rise residential) | 828217 | 825522 | 13 | 828400 | 825535 | 0 | 183 | 13 | 184 |
| CN3 | Bayview Garden - Block 2 (high rise residential) | 828242 | 825556 | 13 | 828400 | 825535 | 0 | 159 | 13 | 160 |
| CN4 | Bayview Garden - Block 3 (high rise residential) | 828270 | 825590 | 13 | 828400 | 825535 | 0 | 141 | 13 | 142 |
| CN5 | Bayview Garden - Block 4 (high rise residential) | 828324 | 825624 | 13 | 828400 | 825535 | 0 | 117 | 13 | 118 |
| CN6 | Bayview Garden - Block 5 (high rise residential) | 828364 | 825643 | 13 | 828400 | 825535 | 0 | 114 | 13 | 115 |
| CN7 | Belvedere Garden Phase 3 - Block 4 (high rise res.) | 828545 | 825792 | 12 | 828400 | 825535 | 0 | 295 | 12 | 295 |
| CN8 | Belvedere Garden Phase 3 - Block 5 (high rise res.) | 828576 | 825818 | 12 | 828400 | 825535 | 0 | 333 | 12 | 333 |
| CN9 | Belvedere Garden Phase 3 - Block 6 (high rise res.) | 828608 | 825843 | 12 | 828400 | 825535 | 0 | 372 | 12 | 372 |
| CN10 | Belvedere Garden Phase 3 - Block 7 (high rise res.) | 828641 | 825869 | 12 | 828400 | 825535 | 0 | 412 | 12 | 412 |
| CN11 | Clague Garden Estate - School | 829305 | 825680 | 5 | 829300 | 825400 | 0 | 280 | 5 | 322 |
| CN12 | Clague Garden Estate - Tower C (high rise res.) | 829424 | 825600 | 5 | 829300 | 825400 | 0 | 235 | 5 | 235 |

Table A1.3 Distances From Represenative Noise Sensitive Receivers to:- Area A

| NSR ID | Description | NSR Location | | | Area A | | | Horiz. Dist. (m) | Vert. Dist. (m) | Total Dist. (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Easting | Northing | Elevation | Easting | Northing | Elevation | | | |
| CN1 | Blossum Terrace (low rise residential) | 828097 | 825586 | 50 | 829000 | 825600 | 0 | 903 | 50 | 904 |
| CN2 | Bayview Garden - Block 1 (high rise residential) | 828217 | 825522 | 13 | 829000 | 825600 | 0 | 787 | 13 | 787 |
| CN3 | Bayview Garden - Block 2 (high rise residential) | 828242 | 825556 | 13 | 829000 | 825600 | 0 | 759 | 13 | 759 |
| CN4 | Bayview Garden - Block 3 (high rise residential) | 828270 | 825590 | 13 | 829000 | 825600 | 0 | 730 | 13 | 730 |
| CN5 | Bayview Garden - Block 4 (high rise residential) | 828324 | 825624 | 13 | 829000 | 825600 | 0 | 676 | 13 | 677 |
| CN6 | Bayview Garden - Block 5 (high rise residential) | 828364 | 825643 | 13 | 829000 | 825600 | 0 | 637 | 13 | 638 |
| CN7 | Belvedere Garden Phase 3 - Block 4 (high rise res.) | 828545 | 825792 | 12 | 829000 | 825600 | 0 | 494 | 12 | 494 |
| CN8 | Belvedere Garden Phase 3 - Block 5 (high rise res.) | 828576 | 825818 | 12 | 829000 | 825600 | 0 | 477 | 12 | 477 |
| CN9 | Belvedere Garden Phase 3 - Block 6 (high rise res.) | 828608 | 825843 | 12 | 829000 | 825600 | 0 | 461 | 12 | 461 |
| CN10 | Belvedere Garden Phase 3 - Block 7 (high rise res.) | 828641 | 825869 | 12 | 829000 | 825600 | 0 | 449 | 12 | 449 |
| CN11 | Clague Garden Estate - School | 829305 | 825680 | 5 | 829175 | 825585 | 0 | 161 | 5 | 197 |
| CN12 | Clague Garden Estate - Tower C (high rise res.) | 829424 | 825600 | 5 | 829175 | 825585 | 0 | 249 | 5 | 250 |

Table A1.4 Distances From Represenative Noise Sensitive Receivers to:- Area C

| NSR ID | Description | NSR Location | | | Area C | | | Horiz. Dist. (m) | Vert. Dist. (m) | Total Dist. (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Easting | Northing | Elevation | Easting | Northing | Elevation | | | |
| CN1 | Blossum Terrace (low rise residential) | 828097 | 825586 | 50 | 828560 | 825645 | 0 | 467 | 50 | 469 |
| CN2 | Bayview Garden - Block 1 (high rise residential) | 828217 | 825522 | 13 | 828560 | 825645 | 0 | 364 | 13 | 365 |
| CN3 | Bayview Garden - Block 2 (high rise residential) | 828242 | 825556 | 13 | 828560 | 825645 | 0 | 330 | 13 | 330 |
| CN4 | Bayview Garden - Block 3 (high rise residential) | 828270 | 825590 | 13 | 828560 | 825645 | 0 | 295 | 13 | 295 |
| CN5 | Bayview Garden - Block 4 (high rise residential) | 828324 | 825624 | 13 | 828560 | 825645 | 0 | 237 | 13 | 237 |
| CN6 | Bayview Garden - Block 5 (high rise residential) | 828364 | 825643 | 13 | 828560 | 825645 | 0 | 196 | 13 | 196 |
| CN7 | Belvedere Garden Phase 3 - Block 4 (high rise res.) | 828545 | 825792 | 12 | 828560 | 825645 | 0 | 148 | 12 | 148 |
| CN8 | Belvedere Garden Phase 3 - Block 5 (high rise res.) | 828576 | 825818 | 12 | 828560 | 825645 | 0 | 174 | 12 | 174 |
| CN9 | Belvedere Garden Phase 3 - Block 6 (high rise res.) | 828608 | 825843 | 12 | 828560 | 825645 | 0 | 204 | 12 | 204 |
| CN10 | Belvedere Garden Phase 3 - Block 7 (high rise res.) | 828641 | 825869 | 12 | 828560 | 825645 | 0 | 238 | 12 | 238 |
| CN11 | Clague Garden Estate - School | 829305 | 825680 | 5 | 828720 | 825635 | 0 | 587 | 5 | 604 |
| CN12 | Clague Garden Estate - Tower C (high rise res.) | 829424 | 825600 | 5 | 828720 | 825635 | 0 | 705 | 5 | 705 |

Table A1.5 Distances From Represenative Noise Sensitive Receivers to:- Area D

| NSR ID | Description | NSR Location | | | Area D | | | Horiz. Dist. (m) | Vert. Dist. (m) | Total Dist. (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Easting | Northing | Elevation | Easting | Northing | Elevation | | | |
| CN1 | Blossum Terrace (low rise residential) | 828097 | 825586 | 50 | 828750 | 825830 | 0 | 697 | 50 | 699 |
| CN2 | Bayview Garden - Block 1 (high rise residential) | 828217 | 825522 | 13 | 828750 | 825830 | 0 | 616 | 13 | 616 |
| CN3 | Bayview Garden - Block 2 (high rise residential) | 828242 | 825556 | 13 | 828750 | 825830 | 0 | 577 | 13 | 577 |
| CN4 | Bayview Garden - Block 3 (high rise residential) | 828270 | 825590 | 13 | 828750 | 825830 | 0 | 537 | 13 | 537 |
| CN5 | Bayview Garden - Block 4 (high rise residential) | 828324 | 825624 | 13 | 828750 | 825830 | 0 | 473 | 13 | 473 |
| CN6 | Bayview Garden - Block 5 (high rise residential) | 828364 | 825643 | 13 | 828750 | 825830 | 0 | 429 | 13 | 429 |
| CN7 | Belvedere Garden Phase 3 - Block 4 (high rise res.) | 828545 | 825792 | 12 | 828750 | 825830 | 0 | 208 | 12 | 209 |
| CN8 | Belvedere Garden Phase 3 - Block 5 (high rise res.) | 828576 | 825818 | 12 | 828750 | 825830 | 0 | 174 | 12 | 175 |
| CN9 | Belvedere Garden Phase 3 - Block 6 (high rise res.) | 828608 | 825843 | 12 | 828750 | 825830 | 0 | 143 | 12 | 143 |
| CN10 | Belvedere Garden Phase 3 - Block 7 (high rise res.) | 828641 | 825869 | 12 | 828750 | 825830 | 0 | 116 | 12 | 116 |
| CN11 | Clague Garden Estate - School | 829305 | 825680 | 5 | 828975 | 825785 | 0 | 346 | 5 | 349 |
| CN12 | Clague Garden Estate - Tower C (high rise res.) | 829424 | 825600 | 5 | 828975 | 825785 | 0 | 486 | 5 | 486 |

Table A1.6 Distances From Represenative Noise Sensitive Receivers to:- Area E

| NSR ID | Description | NSR Location | | | Area E | | | Horiz. Dist. (m) | Vert. Dist. (m) | Total Dist. (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Easting | Northing | Elevation | Easting | Northing | Elevation | | | |
| CN1 | Blossum Terrace (low rise residential) | 828097 | 825586 | 50 | 828775 | 825605 | 0 | 678 | 50 | 680 |
| CN2 | Bayview Garden - Block 1 (high rise residential) | 828217 | 825522 | 13 | 828775 | 825605 | 0 | 564 | 13 | 564 |
| CN3 | Bayview Garden - Block 2 (high rise residential) | 828242 | 825556 | 13 | 828775 | 825605 | 0 | 535 | 13 | 535 |
| CN4 | Bayview Garden - Block 3 (high rise residential) | 828270 | 825590 | 13 | 828775 | 825605 | 0 | 505 | 13 | 505 |
| CN5 | Bayview Garden - Block 4 (high rise residential) | 828324 | 825624 | 13 | 828775 | 825605 | 0 | 451 | 13 | 452 |
| CN6 | Bayview Garden - Block 5 (high rise residential) | 828364 | 825643 | 13 | 828775 | 825605 | 0 | 413 | 13 | 413 |
| CN7 | Belvedere Garden Phase 3 - Block 4 (high rise res.) | 828545 | 825792 | 12 | 828775 | 825605 | 0 | 296 | 12 | 297 |
| CN8 | Belvedere Garden Phase 3 - Block 5 (high rise res.) | 828576 | 825818 | 12 | 828775 | 825605 | 0 | 291 | 12 | 292 |
| CN9 | Belvedere Garden Phase 3 - Block 6 (high rise res.) | 828608 | 825843 | 12 | 828775 | 825605 | 0 | 291 | 12 | 291 |
| CN10 | Belvedere Garden Phase 3 - Block 7 (high rise res.) | 828641 | 825869 | 12 | 828775 | 825605 | 0 | 296 | 12 | 296 |
| CN11 | Clague Garden Estate - School | 829305 | 825680 | 5 | 828950 | 825580 | 0 | 369 | 5 | 394 |
| CN12 | Clague Garden Estate - Tower C (high rise res.) | 829424 | 825600 | 5 | 828950 | 825580 | 0 | 474 | 5 | 474 |

Table A1.7 Distances From Represenative Noise Sensitive Receivers to:- Reclamation Roads

| NSR ID | Description | NSR Location | | | Nearest Road | | | Horiz. Dist. (m) | Vert. Dist. (m) | Total Dist. (m) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Easting | Northing | Elevation | Easting | Northing | Elevation | | | |
| CN1 | Blossum Terrace (low rise residential) | 828097 | 825586 | 50 | 828434 | 825558 | 0 | 338 | 50 | 342 |
| CN2 | Bayview Garden - Block 1 (high rise residential) | 828217 | 825522 | 13 | 828434 | 825558 | 0 | 220 | 13 | 220 |
| CN3 | Bayview Garden - Block 2 (high rise residential) | 828242 | 825556 | 13 | 828434 | 825558 | 0 | 192 | 13 | 192 |
| CN4 | Bayview Garden - Block 3 (high rise residential) | 828270 | 825590 | 13 | 828434 | 825558 | 0 | 167 | 13 | 168 |
| CN5 | Bayview Garden - Block 4 (high rise residential) | 828324 | 825624 | 13 | 828434 | 825558 | 0 | 128 | 13 | 129 |
| CN6 | Bayview Garden - Block 5 (high rise residential) | 828364 | 825643 | 13 | 828434 | 825558 | 0 | 110 | 13 | 111 |
| CN7 | Belvedere Garden Phase 3 - Block 4 (high rise res.) | 828545 | 825792 | 12 | 828722 | 825800 | 0 | 177 | 12 | 178 |
| CN8 | Belvedere Garden Phase 3 - Block 5 (high rise res.) | 828576 | 825818 | 12 | 828722 | 825800 | 0 | 147 | 12 | 148 |
| CN9 | Belvedere Garden Phase 3 - Block 6 (high rise res.) | 828608 | 825843 | 12 | 828722 | 825800 | 0 | 122 | 12 | 122 |
| CN10 | Belvedere Garden Phase 3 - Block 7 (high rise res.) | 828641 | 825869 | 12 | 828722 | 825800 | 0 | 106 | 12 | 107 |
| CN11 | Clague Garden Estate - School | 829305 | 825680 | 5 | 829187 | 825545 | 0 | 179 | 5 | 219 |
| CN12 | Clague Garden Estate - Tower C (high rise res.) | 829424 | 825600 | 5 | 829187 | 825545 | 0 | 243 | 5 | 243 |

# APPENDIX A2

## OPERATIONAL NOISE (NOISE IMPACT AT EXISTING NSRS)

The following two attachments are attached to this Appendix A2:

(i) Table A2.1 Clague Garden Estate

(ii) Table A2.2 Bayview Garden and Belvedere Garden

# Table A2.1
# Clague Garden Estate

| NSR | Height (m) | 1994 Existing dB(A) | 2011 Unmitigated dB(A) | 3m Parapet dB(A) | 5m Parapet dB(A) | 7m Parapet dB(A) | 5m+3m overhang dB(A) |
|---|---|---|---|---|---|---|---|
| C1 | 10.9 | 70.7 | 75.1 | 72.8 | 72.7 | 72.7 | 72.7 |
| C1 | 13.7 | 72.3 | 78.8 | 77.1 | 77.0 | 77.0 | 77.1 |
| C2 | 10.9 | 70.6 | 74.2 | 72.7 | 72.6 | 72.5 | 72.6 |
| C2 | 13.7 | 72.7 | 80.9 | 78.6 | 78.5 | 78.5 | 78.6 |
| C3 | 10.9 | 70.5 | 73.8 | 72.8 | 72.7 | 72.7 | 72.7 |
| C3 | 13.7 | 72.5 | 80.7 | 78.0 | 78.0 | 77.9 | 78.0 |
| C4 | 10.9 | 70.1 | 73.9 | 72.6 | 72.5 | 72.5 | 72.5 |
| C4 | 13.7 | 72.8 | 83.6 | 79.6 | 79.6 | 79.6 | 79.6 |
| C5 | 9.9 | 66.7 | 72.7 | 71.1 | 71.0 | 71.0 | 70.9 |
| C5 | 26.7 | 78.3 | 79.6 | 78.6 | 78.6 | 78.6 | 78.6 |
| C5 | 43.5 | 78.0 | 79.2 | 79.2 | 78.4 | 78.4 | 78.4 |
| C5 | 60.3 | 77.6 | 78.7 | 78.7 | 78.7 | 77.9 | 77.9 |
| C5 | 77.1 | 77.1 | 78.2 | 78.2 | 78.2 | 77.4 | 77.4 |
| C5 | 93.9 | 76.5 | 77.6 | 77.6 | 77.6 | 77.6 | 76.9 |
| C5 | 110.7 | 76.0 | 77.0 | 77.0 | 77.0 | 77.0 | 76.3 |
| C6 | 9.8 | 67.2 | 74.1 | 72.5 | 72.4 | 72.4 | 72.4 |
| C6 | 26.6 | 76.9 | 78.2 | 77.3 | 77.3 | 77.3 | 77.3 |
| C6 | 43.4 | 76.7 | 78.0 | 77.1 | 77.1 | 77.1 | 77.1 |
| C6 | 60.2 | 76.4 | 77.6 | 77.6 | 76.8 | 76.8 | 76.7 |
| C6 | 77 | 76.0 | 77.1 | 77.1 | 77.1 | 76.3 | 76.3 |
| C6 | 93.8 | 75.5 | 76.6 | 76.6 | 76.6 | 75.9 | 75.9 |
| C6 | 110.6 | 75.1 | 76.1 | 76.1 | 76.1 | 76.1 | 75.4 |
| C7 | 9.8 | 67.7 | 75.4 | 73.9 | 73.8 | 73.8 | 73.8 |
| C7 | 12.6 | 69.2 | 76.1 | 74.7 | 74.6 | 74.6 | 74.5 |
| C7 | 15.4 | 71.6 | 76.6 | 75.3 | 75.3 | 75.3 | 75.3 |
| C7 | 18.2 | 77.0 | 78.2 | 77.4 | 77.3 | 77.3 | 77.3 |
| C8 | 9.8 | 67.2 | 75.0 | 73.5 | 73.5 | 73.5 | 73.4 |
| C8 | 26.6 | 76.2 | 77.3 | 76.5 | 76.5 | 76.5 | 76.5 |
| C8 | 43.4 | 76.1 | 77.2 | 76.4 | 76.4 | 76.4 | 76.4 |
| C8 | 60.2 | 75.8 | 76.9 | 76.9 | 76.1 | 76.1 | 76.1 |
| C8 | 77 | 75.5 | 76.6 | 76.6 | 75.8 | 75.8 | 75.8 |
| C8 | 93.8 | 75.1 | 76.2 | 76.2 | 76.2 | 75.4 | 75.4 |
| C8 | 110.6 | 74.7 | 75.7 | 75.7 | 75.7 | 75.0 | 75.0 |
| C9 | 10.9 | 66.9 | 73.8 | 72.4 | 72.4 | 72.4 | 72.3 |
| C9 | 27.7 | 74.7 | 75.7 | 74.9 | 74.9 | 74.9 | 74.9 |
| C9 | 44.5 | 74.6 | 75.6 | 74.8 | 74.8 | 74.8 | 74.8 |
| C9 | 61.3 | 74.4 | 75.4 | 74.6 | 74.6 | 74.6 | 74.6 |
| C9 | 78.1 | 74.1 | 75.1 | 75.1 | 74.3 | 74.3 | 74.3 |
| C9 | 94.9 | 73.8 | 74.7 | 74.7 | 74.0 | 74.0 | 74.0 |
| C9 | 111.7 | 73.4 | 74.4 | 74.4 | 74.4 | 73.6 | 73.6 |
| C10 | 10.9 | 69.3 | 75.8 | 75.4 | 75.3 | 75.3 | 75.3 |
| C10 | 27.7 | 77.9 | 78.9 | 78.1 | 78.1 | 78.1 | 78.1 |
| C10 | 44.5 | 77.5 | 78.5 | 78.5 | 77.7 | 77.7 | 77.7 |
| C10 | 61.3 | 77.0 | 77.9 | 77.9 | 77.9 | 77.2 | 77.2 |
| C10 | 78.1 | 76.4 | 77.3 | 77.3 | 77.3 | 77.2 | 76.6 |
| C10 | 94.9 | 75.8 | 76.6 | 76.6 | 76.6 | 76.6 | 76.0 |
| C10 | 111.7 | 75.2 | 76.1 | 76.1 | 76.1 | 76.1 | 75.4 |
| C11 | 10.9 | 68.3 | 76.1 | 75.1 | 75.1 | 75.1 | 75.0 |
| C11 | 27.7 | 77.4 | 78.9 | 77.8 | 77.8 | 77.8 | 77.8 |
| C11 | 44.5 | 77.1 | 78.4 | 78.4 | 77.4 | 77.4 | 77.4 |
| C11 | 61.3 | 76.5 | 77.8 | 77.8 | 77.8 | 76.8 | 76.8 |

# Table A2.1
# Clague Garden Estate

| NSR | Height (m) | 1994 Existing dB(A) | 2011 Unmitigated dB(A) | 2011 3m Parapet dB(A) | 2011 5m Parapet dB(A) | 2011 7m Parapet dB(A) | 2011 5m+3m overhang dB(A) |
|---|---|---|---|---|---|---|---|
| C11 | 78.1 | 75.9 | 77.1 | 77.1 | 77.1 | 77.0 | 76.2 |
| C11 | 94.9 | 75.3 | 76.5 | 76.5 | 76.5 | 76.5 | 75.6 |
| C11 | 111.7 | 74.7 | 75.9 | 75.9 | 75.9 | 75.9 | 75.0 |
| C12 | 10.9 | 66.2 | 75.1 | 73.0 | 73.0 | 73.0 | 72.8 |
| C12 | 27.7 | 74.9 | 76.6 | 75.4 | 75.4 | 75.3 | 75.3 |
| C12 | 44.5 | 74.6 | 76.3 | 75.2 | 75.1 | 75.1 | 75.1 |
| C12 | 61.3 | 74.2 | 75.8 | 75.8 | 74.6 | 74.6 | 74.6 |
| C12 | 78.1 | 73.7 | 75.2 | 75.2 | 75.2 | 74.1 | 74.1 |
| C12 | 94.9 | 73.1 | 74.6 | 74.6 | 74.6 | 73.7 | 73.6 |
| C12 | 111.7 | 72.6 | 74.1 | 74.1 | 74.1 | 74.1 | 73.1 |

Table A2.2

Bayview Garden and Belvedere Garden

| | | | | 2011 | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1994 | > 70 | unmitigated | > 70 | 5m + 2m overhang | > 70 | Without New Rd. |
| NSR | Height (m) | dB(A) | dB(A) | dB(A) | dB(A) | dB(A) | dB(A) | dB(A) |
| B1 | 19.1 | 71.9 | Y | 75.4 | Y | 71.2 | Y | 71.0 |
| B1 | 35.9 | 69.2 | | 73.6 | Y | 69.9 | | 68.3 |
| B1 | 52.7 | 67.5 | | 72.3 | Y | 70.3 | | 66.6 |
| B1 | 69.5 | 66.3 | | 71.2 | Y | 69.2 | | 65.3 |
| B1 | 86.3 | 65.3 | | 70.3 | | 69.3 | | 64.3 |
| B1 | 103.1 | 64.5 | | 69.5 | | 69.3 | | 63.5 |
| B1 | 119.9 | 63.9 | | 68.9 | | 68.6 | | 62.9 |
| B2 | 19.1 | 71.4 | Y | 75.2 | Y | 72.1 | Y | 72.0 |
| B2 | 35.9 | 68.6 | | 73.0 | Y | 70.0 | | 69.1 |
| B2 | 52.7 | 66.9 | | 71.4 | Y | 69.7 | | 67.2 |
| B2 | 69.5 | 65.6 | | 70.3 | | 69.5 | | 65.9 |
| B2 | 86.3 | 64.6 | | 69.3 | | 68.6 | | 65.0 |
| B2 | 103.1 | 63.8 | | 68.6 | | 68.5 | | 64.1 |
| B2 | 119.9 | 63.1 | | 67.9 | | 67.9 | | 63.5 |
| B3 | 19.1 | 69.6 | | 73.5 | Y | 72.0 | Y | 71.9 |
| B3 | 35.9 | 68.2 | | 72.6 | Y | 70.7 | Y | 69.8 |
| B3 | 52.7 | 67.2 | | 71.6 | Y | 69.6 | | 68.3 |
| B3 | 69.5 | 66.5 | | 70.7 | Y | 68.6 | | 67.2 |
| B3 | 86.3 | 65.9 | | 70.0 | | 68.4 | | 66.3 |
| B3 | 103.1 | 65.4 | | 69.3 | | 68.2 | | 65.6 |
| B3 | 119.9 | 65.0 | | 68.7 | | 67.8 | | 65.0 |
| B4 | 19.1 | 70.5 | | 74.4 | Y | 72.9 | Y | 72.8 |
| B4 | 35.9 | 69.6 | | 74.1 | Y | 72.3 | Y | 71.4 |
| B4 | 52.7 | 68.6 | | 73.3 | Y | 71.0 | Y | 70.1 |
| B4 | 69.5 | 67.8 | | 72.5 | Y | 70.5 | | 69.0 |
| B4 | 86.3 | 67.2 | | 71.8 | Y | 69.7 | | 68.2 |
| B4 | 103.1 | 66.6 | | 71.1 | Y | 69.0 | | 67.4 |
| B4 | 119.9 | 66.2 | | 70.6 | Y | 69.4 | | 66.8 |
| B5 | 19.1 | 64.5 | | 66.0 | | 60.7 | | 57.8 |
| B5 | 35.9 | 66.4 | | 70.6 | Y | 69.1 | | 68.4 |
| B5 | 52.7 | 65.5 | | 70.6 | Y | 69.0 | | 67.2 |
| B5 | 69.5 | 64.7 | | 70.2 | | 68.2 | | 66.3 |
| B5 | 86.3 | 64.0 | | 69.7 | | 67.4 | | 65.4 |
| B5 | 103.1 | 63.4 | | 69.1 | | 66.8 | | 64.7 |
| B5 | 119.9 | 62.9 | | 68.6 | | 66.2 | | 64.1 |
| B6 | 19.1 | 62.6 | | 66.5 | | 62.9 | | 62.4 |
| B6 | 35.9 | 65.1 | | 70.6 | Y | 68.9 | | 67.8 |
| B6 | 52.7 | 64.1 | | 70.2 | | 68.1 | | 66.7 |
| B6 | 69.5 | 63.2 | | 69.5 | | 67.2 | | 65.7 |
| B6 | 86.3 | 62.4 | | 68.8 | | 66.5 | | 64.8 |
| B6 | 103.1 | 61.7 | | 68.1 | | 65.8 | | 64.1 |
| B6 | 119.9 | 61.1 | | 67.6 | | 65.2 | | 63.4 |
| B7 | 19.1 | 67.8 | | 70.5 | | 69.5 | | 69.3 |
| B7 | 35.9 | 67.5 | | 69.8 | | 68.8 | | 68.5 |
| B7 | 52.7 | 66.9 | | 69.2 | | 68.6 | | 67.5 |
| B7 | 69.5 | 66.4 | | 69.1 | | 67.8 | | 66.6 |
| B7 | 86.3 | 65.9 | | 68.9 | | 67.1 | | 65.9 |
| B7 | 103.1 | 65.4 | | 68.4 | | 66.5 | | 65.2 |
| B7 | 119.9 | 65.1 | | 68.1 | | 66.1 | | 64.7 |
| B8 | 19.1 | 67.8 | | 69.2 | | 66.9 | | 66.3 |
| B8 | 35.9 | 68.6 | | 71.5 | Y | 70.2 | | 69.9 |
| B8 | 52.7 | 68.1 | | 71.3 | Y | 70.3 | | 69.0 |
| B8 | 69.5 | 67.5 | | 71.0 | Y | 69.6 | | 68.2 |
| B8 | 86.3 | 66.9 | | 70.7 | Y | 68.9 | | 67.4 |
| B8 | 103.1 | 66.5 | | 70.4 | | 68.3 | | 66.8 |
| B8 | 119.9 | 66.1 | | 69.9 | | 67.8 | | 66.2 |
| B9 | 19.1 | 59.5 | | 64.5 | | 60.1 | | 56.2 |
| B9 | 35.9 | 65.6 | | 69.0 | | 67.7 | | 67.2 |
| B9 | 52.7 | 65.0 | | 68.4 | | 68.0 | | 66.5 |
| B9 | 69.5 | 64.4 | | 68.3 | | 67.5 | | 65.8 |
| B9 | 86.3 | 63.8 | | 68.2 | | 66.9 | | 65.1 |
| B9 | 103.1 | 63.2 | | 68.0 | | 66.4 | | 64.5 |
| B9 | 119.9 | 62.7 | | 67.9 | | 65.8 | | 63.9 |
| B10 | 19.1 | 59.0 | | 63.1 | | 56.9 | | 55.9 |
| B10 | 35.9 | 64.3 | | 68.2 | | 66.6 | | 66.5 |
| B10 | 52.7 | 63.7 | | 68.1 | | 67.1 | | 65.7 |
| B10 | 69.5 | 63.0 | | 68.2 | | 66.5 | | 64.9 |

Table A2.2
Bayview Garden and Belvedere Garden

| | | | | 2011 | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1994 | > 70 | unmitigated | > 70 | 5m + 2m overhang | > 70 | Without New Rd. |
| NSR | Height (m) | dB(A) | dB(A) | dB(A) | dB(A) | dB(A) | dB(A) | dB(A) |
| B10 | 86.3 | 62.3 | | 68.1 | | 65.9 | | 64.2 |
| B10 | 103.1 | 61.7 | | 67.7 | | 65.3 | | 63.6 |
| B10 | 119.9 | 61.1 | | 67.2 | | 64.8 | | 63.0 |
| B11 | 19.1 | 63.7 | | 64.1 | | 60.3 | | 56.9 |
| B11 | 35.9 | 66.5 | | 68.5 | | 67.6 | | 67.0 |
| B11 | 52.7 | 66.1 | | 67.9 | | 67.1 | | 66.2 |
| B11 | 69.5 | 65.6 | | 67.2 | | 66.4 | | 65.5 |
| B11 | 86.3 | 65.1 | | 66.6 | | 65.8 | | 64.8 |
| B11 | 103.1 | 64.8 | | 66.2 | | 65.2 | | 64.1 |
| B11 | 119.9 | 64.5 | | 66.2 | | 64.7 | | 63.5 |
| B12 | 19.1 | 63.3 | | 65.5 | | 60.6 | | 56.9 |
| B12 | 35.9 | 67.6 | | 70.2 | | 69.0 | | 68.6 |
| B12 | 52.7 | 67.1 | | 69.6 | | 69.0 | | 67.9 |
| B12 | 69.5 | 66.6 | | 69.2 | | 68.5 | | 67.2 |
| B12 | 86.3 | 66.1 | | 68.9 | | 67.9 | | 66.5 |
| B12 | 103.1 | 65.6 | | 68.8 | | 67.3 | | 65.9 |
| B12 | 119.9 | 65.2 | | 68.6 | | 66.8 | | 65.3 |
| B13 | 19.1 | 67.8 | | 70.6 | Y | 69.4 | | 69.0 |
| B13 | 35.9 | 67.8 | | 71.1 | Y | 70.0 | | 69.5 |
| B13 | 52.7 | 67.1 | | 70.5 | | 69.8 | | 68.6 |
| B13 | 69.5 | 66.4 | | 70.0 | | 69.1 | | 67.8 |
| B13 | 86.3 | 65.7 | | 69.5 | | 68.4 | | 67.0 |
| B13 | 103.1 | 65.1 | | 69.3 | | 67.8 | | 66.4 |
| B13 | 119.9 | 64.6 | | 69.0 | | 67.3 | | 65.8 |
| B14 | 19.1 | 66.4 | | 69.5 | | 68.7 | | 68.4 |
| B14 | 35.9 | 65.9 | | 69.3 | | 68.3 | | 67.9 |
| B14 | 52.7 | 65.1 | | 68.6 | | 68.2 | | 66.9 |
| B14 | 69.5 | 64.3 | | 68.2 | | 67.5 | | 66.0 |
| B14 | 86.3 | 63.5 | | 67.9 | | 66.8 | | 65.2 |
| B14 | 103.1 | 62.9 | | 67.8 | | 66.2 | | 64.5 |
| B14 | 119.9 | 62.3 | | 67.9 | | 66.1 | | 63.9 |
| B15 | 19.1 | 66.8 | | 69.3 | | 68.1 | | 67.7 |
| B15 | 35.9 | 66.3 | | 68.7 | | 67.5 | | 66.9 |
| B15 | 52.7 | 65.7 | | 67.9 | | 66.5 | | 65.9 |
| B15 | 69.5 | 65.1 | | 67.1 | | 65.6 | | 65.0 |
| B15 | 86.3 | 64.5 | | 66.4 | | 64.9 | | 64.1 |
| B15 | 103.1 | 64.1 | | 65.7 | | 64.2 | | 63.4 |
| B15 | 119.9 | 63.8 | | 65.2 | | 63.6 | | 62.8 |
| B16 | 19.1 | 66.3 | | 69.7 | | 68.6 | | 68.0 |
| B16 | 35.9 | 66.2 | | 69.7 | | 68.7 | | 67.9 |
| B16 | 52.7 | 65.4 | | 68.9 | | 68.2 | | 67.1 |
| B16 | 69.5 | 64.7 | | 68.2 | | 67.4 | | 66.2 |
| B16 | 86.3 | 63.9 | | 67.6 | | 66.8 | | 65.4 |
| B16 | 103.1 | 63.3 | | 67.1 | | 66.1 | | 64.7 |
| B16 | 119.9 | 62.7 | | 66.7 | | 65.6 | | 64.1 |
| B17 | 19.1 | 69.6 | | 72.8 | Y | 71.9 | Y | 71.5 |
| B17 | 35.9 | 68.8 | | 72.0 | Y | 70.9 | Y | 70.4 |
| B17 | 52.7 | 67.8 | | 71.1 | Y | 70.2 | | 69.3 |
| B17 | 69.5 | 67.0 | | 70.4 | | 69.3 | | 68.3 |
| B17 | 86.3 | 66.3 | | 69.9 | | 68.6 | | 67.4 |
| B17 | 103.1 | 65.6 | | 69.6 | | 68.2 | | 66.7 |
| B17 | 119.9 | 65.1 | | 69.1 | | 67.6 | | 66.0 |
| B18 | 19.1 | 68.5 | | 71.9 | Y | 71.1 | Y | 70.7 |
| B18 | 35.9 | 67.4 | | 70.8 | Y | 69.9 | | 69.3 |
| B18 | 52.7 | 66.3 | | 69.9 | | 69.1 | | 68.0 |
| B18 | 69.5 | 65.3 | | 69.2 | | 68.1 | | 66.9 |
| B18 | 86.3 | 64.4 | | 68.6 | | 67.3 | | 66.0 |
| B18 | 103.1 | 63.7 | | 68.3 | | 66.9 | | 65.2 |
| B18 | 119.9 | 63.1 | | 67.8 | | 66.4 | | 64.6 |
| B19 | 19.1 | 69.4 | | 72.2 | Y | 71.4 | Y | 71.3 |
| B19 | 35.9 | 68.9 | | 71.2 | Y | 70.3 | | 70.0 |
| B19 | 52.7 | 68.2 | | 70.2 | | 69.2 | | 68.9 |
| B19 | 69.5 | 67.5 | | 69.4 | | 68.3 | | 68.0 |
| B19 | 86.3 | 67.1 | | 68.6 | | 67.6 | | 67.2 |
| B19 | 103.1 | 66.7 | | 68.0 | | 67.2 | | 66.5 |
| B19 | 119.9 | 66.3 | | 67.5 | | 67.4 | | 66.0 |
| B20 | 19.1 | 70.5 | | 73.4 | Y | 72.6 | Y | 72.3 |

Table A2.2
Bayview Garden and Belvedere Garden

| | | | | 2011 | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1994 | > 70 | unmitigated | > 70 | 5m + 2m overhang | > 70 | Without New Rd. |
| NSR | Height (m) | dB(A) | dB(A) | dB(A) | dB(A) | dB(A) | dB(A) | dB(A) |
| B20 | 35.9 | 70.0 | | 72.6 | Y | 71.7 | Y | 71.3 |
| B20 | 52.7 | 69.3 | | 71.7 | Y | 70.7 | Y | 70.2 |
| B20 | 69.5 | 68.6 | | 70.8 | Y | 69.8 | | 69.3 |
| B20 | 86.3 | 68.0 | | 70.1 | | 69.1 | | 68.5 |
| B20 | 103.1 | 67.6 | | 69.5 | | 68.5 | | 67.9 |
| B20 | 119.9 | 67.2 | | 69.0 | | 68.7 | | 67.3 |
| B21 | 22.9 | 62.7 | | 61.3 | | 61.1 | | 60.2 |
| B21 | 39.7 | 66.4 | | 68.3 | | 68.2 | | 68.0 |
| B21 | 56.5 | 66.3 | | 68.1 | | 68.1 | | 67.9 |
| B21 | 73.3 | 65.9 | | 67.7 | | 67.6 | | 67.4 |
| B21 | 90.1 | 65.7 | | 67.2 | | 67.2 | | 66.9 |
| B21 | 106.9 | 65.4 | | 66.7 | | 66.7 | | 66.5 |
| B21 | 123.7 | 65.1 | | 66.3 | | 66.3 | | 66.0 |
| B22 | 22.9 | 63.5 | | 64.2 | | 62.7 | | 61.6 |
| B22 | 39.7 | 67.0 | | 69.2 | | 68.8 | | 68.5 |
| B22 | 56.5 | 66.8 | | 69.2 | | 68.9 | | 68.6 |
| B22 | 73.3 | 66.5 | | 68.7 | | 68.4 | | 68.1 |
| B22 | 90.1 | 66.2 | | 68.3 | | 68.0 | | 67.7 |
| B22 | 106.9 | 65.8 | | 67.8 | | 67.7 | | 67.2 |
| B22 | 123.7 | 65.5 | | 67.4 | | 67.3 | | 66.7 |
| B23 | 22.9 | 56.1 | | 55.8 | | 55.8 | | 53.3 |
| B23 | 39.7 | 64.4 | | 67.5 | | 67.5 | | 67.3 |
| B23 | 56.5 | 64.2 | | 67.3 | | 67.3 | | 67.2 |
| B23 | 73.3 | 63.8 | | 66.9 | | 66.9 | | 66.7 |
| B23 | 90.1 | 63.4 | | 66.5 | | 66.5 | | 66.3 |
| B23 | 106.9 | 63.0 | | 66.0 | | 66.0 | | 65.8 |
| B23 | 123.7 | 62.7 | | 65.6 | | 65.6 | | 65.4 |
| B24 | 22.9 | 54.8 | | 59.7 | | 58.5 | | 56.5 |
| B24 | 39.7 | 64.8 | | 68.2 | | 67.9 | | 67.6 |
| B24 | 56.5 | 64.6 | | 68.3 | | 68.0 | | 67.7 |
| B24 | 73.3 | 64.1 | | 67.8 | | 67.6 | | 67.3 |
| B24 | 90.1 | 63.6 | | 67.4 | | 67.2 | | 66.8 |
| B24 | 106.9 | 63.2 | | 66.9 | | 66.8 | | 66.3 |
| B24 | 123.7 | 62.7 | | 66.5 | | 66.4 | | 65.9 |
| B25 | 22.9 | 70.9 | Y | 73.4 | Y | 73.4 | Y | 73.4 |
| B25 | 39.7 | 70.5 | | 72.5 | Y | 72.5 | Y | 72.5 |
| B25 | 56.5 | 69.8 | | 71.6 | Y | 71.6 | Y | 71.5 |
| B25 | 73.3 | 69.2 | | 70.8 | Y | 70.8 | Y | 70.6 |
| B25 | 90.1 | 68.8 | | 70.1 | | 70.1 | | 70.0 |
| B25 | 106.9 | 68.4 | | 69.5 | | 69.5 | | 69.4 |
| B25 | 123.7 | 68.2 | | 69.0 | | 69.0 | | 68.9 |
| B26 | 22.9 | 71.0 | Y | 73.7 | Y | 73.7 | Y | 73.6 |
| B26 | 39.7 | 70.1 | | 72.7 | Y | 72.6 | Y | 72.5 |
| B26 | 56.5 | 69.2 | | 71.6 | Y | 71.6 | Y | 71.4 |
| B26 | 73.3 | 68.5 | | 70.7 | Y | 70.7 | Y | 70.4 |
| B26 | 90.1 | 68.0 | | 69.9 | | 69.9 | | 69.6 |
| B26 | 106.9 | 67.5 | | 69.3 | | 69.3 | | 68.9 |
| B26 | 123.7 | 67.1 | | 68.7 | | 68.7 | | 68.3 |
| B27 | 22.9 | 71.2 | Y | 73.5 | Y | 73.5 | Y | 73.4 |
| B27 | 39.7 | 70.8 | Y | 72.7 | Y | 72.7 | Y | 72.6 |
| B27 | 56.5 | 70.1 | | 71.8 | Y | 71.8 | Y | 71.7 |
| B27 | 73.3 | 69.6 | | 71.0 | Y | 71.0 | Y | 70.9 |
| B27 | 90.1 | 69.1 | | 70.4 | | 70.4 | | 70.2 |
| B27 | 106.9 | 68.8 | | 69.8 | | 69.8 | | 69.6 |
| B27 | 123.7 | 68.5 | | 69.3 | | 69.3 | | 69.1 |
| B28 | 22.9 | 71.2 | Y | 73.6 | Y | 73.6 | Y | 73.5 |
| B28 | 39.7 | 70.4 | | 72.7 | Y | 72.6 | Y | 72.5 |
| B28 | 56.5 | 69.5 | | 71.6 | Y | 71.6 | Y | 71.4 |
| B28 | 73.3 | 68.9 | | 70.7 | Y | 70.7 | Y | 70.5 |
| B28 | 90.1 | 68.3 | | 70.0 | | 70.0 | | 69.7 |
| B28 | 106.9 | 67.9 | | 69.3 | | 69.3 | | 69.0 |
| B28 | 123.7 | 67.5 | | 68.8 | | 68.8 | | 68.4 |
| B29 | 22.9 | 71.5 | Y | 73.6 | Y | 73.6 | Y | 73.5 |
| B29 | 39.7 | 71.1 | Y | 72.9 | Y | 72.9 | Y | 72.7 |
| B29 | 56.5 | 70.4 | | 72.1 | Y | 72.1 | Y | 71.9 |
| B29 | 73.3 | 69.9 | | 71.3 | Y | 71.3 | Y | 71.1 |
| B29 | 90.1 | 69.5 | | 70.7 | Y | 70.7 | Y | 70.5 |

Table A2.2

Bayview Garden and Belvedere Garden

| | | | | 2011 | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1994 | > 70 | unmitigated | > 70 | 5m + 2m overhang | > 70 | Without New Rd. |
| NSR | Height (m) | dB(A) | dB(A) | dB(A) | dB(A) | dB(A) | dB(A) | dB(A) |
| B29 | 106.9 | 69.2 | | 70.2 | | 70.2 | | 69.9 |
| B29 | 123.7 | 68.9 | | 69.8 | | 69.8 | | 69.5 |
| B30 | 22.9 | 71.5 | Y | 73.8 | Y | 73.8 | Y | 73.6 |
| B30 | 39.7 | 70.7 | Y | 73.0 | Y | 73.0 | Y | 72.7 |
| B30 | 56.5 | 69.9 | | 72.0 | Y | 72.0 | Y | 71.7 |
| B30 | 73.3 | 69.2 | | 71.2 | Y | 71.2 | Y | 70.8 |
| B30 | 90.1 | 68.7 | | 70.5 | Y | 70.5 | Y | 70.1 |
| B30 | 106.9 | 68.3 | | 69.9 | | 69.9 | | 69.5 |
| B30 | 123.7 | 67.9 | | 69.4 | | 69.4 | | 68.9 |
| B31 | 22.9 | 71.6 | Y | 73.9 | Y | 73.9 | Y | 73.6 |
| B31 | 39.7 | 71.3 | Y | 73.2 | Y | 73.2 | Y | 73.0 |
| B31 | 56.5 | 70.7 | Y | 72.4 | Y | 72.4 | Y | 72.1 |
| B31 | 73.3 | 70.2 | | 71.7 | Y | 71.7 | Y | 71.4 |
| B31 | 90.1 | 69.8 | | 71.1 | Y | 71.1 | Y | 70.9 |
| B31 | 106.9 | 69.5 | | 70.6 | Y | 70.6 | Y | 70.4 |
| B31 | 123.7 | 69.2 | | 70.2 | | 70.2 | | 70.0 |
| B32 | 22.9 | 71.6 | Y | 74.0 | Y | 74.0 | Y | 73.7 |
| B32 | 39.7 | 70.9 | Y | 73.1 | Y | 73.1 | Y | 72.9 |
| B32 | 56.5 | 70.1 | | 72.2 | Y | 72.2 | Y | 71.9 |
| B32 | 73.3 | 69.5 | | 71.4 | Y | 71.4 | Y | 71.1 |
| B32 | 90.1 | 69.0 | | 70.8 | Y | 70.8 | Y | 70.4 |
| B32 | 106.9 | 68.6 | | 70.2 | | 70.2 | | 69.9 |
| B32 | 123.7 | 68.2 | | 69.7 | | 69.7 | | 69.4 |

## APPENDIX A3

## OPERATIONAL NOISE (NOISE IMPACT AT NEW NSRS)

The following five attachments are attached to this Appendix A3:

(i) Table A3.1 Noise Assessment for Area 101

(ii) Table A3.2 Noise Assessment for Area 102

(iii) Table A3.3 Noise Assessment for Area 103

(iv) Table A3.4 Noise Assessment for Area 104

# Table A3.1
Noise Assessment for Area 101

| Floor | NSR | Unmitigated dB(A) | NSR | Unmitigated dB(A) | NSR | Unmitigated dB(A) |
|---|---|---|---|---|---|---|
| 1 | A1-1 | 70.1 | A1-8 | 66.1 | A1-15 | 65.5 |
| 7 | A1-1 | 70.7 | A1-8 | 67.2 | A1-15 | 65.2 |
| 13 | A1-1 | 70.2 | A1-8 | 66.5 | A1-15 | 64.7 |
| 19 | A1-1 | 69.7 | A1-8 | 65.9 | A1-15 | 64.2 |
| 25 | A1-1 | 69.3 | A1-8 | 65.4 | A1-15 | 63.7 |
| 31 | A1-1 | 68.9 | A1-8 | 65.0 | A1-15 | 63.3 |
| 37 | A1-1 | 68.8 | A1-8 | 64.6 | A1-15 | 62.9 |
| 1 | A1-2 | 70.4 | A1-9 | 72.3 | A1-16 | 67.1 |
| 7 | A1-2 | 70.7 | A1-9 | 72.0 | A1-16 | 66.7 |
| 13 | A1-2 | 70.2 | A1-9 | 71.5 | A1-16 | 66.0 |
| 19 | A1-2 | 69.7 | A1-9 | 70.9 | A1-16 | 65.4 |
| 25 | A1-2 | 69.3 | A1-9 | 70.4 | A1-16 | 64.9 |
| 31 | A1-2 | 68.9 | A1-9 | 69.9 | A1-16 | 64.5 |
| 37 | A1-2 | 68.8 | A1-9 | 69.7 | A1-16 | 64.1 |
| 1 | A1-3 | 70.7 | A1-10 | 70.0 | A1-17 | 67.2 |
| 7 | A1-3 | 70.7 | A1-10 | 69.9 | A1-17 | 68.4 |
| 13 | A1-3 | 70.1 | A1-10 | 69.5 | A1-17 | 68.9 |
| 19 | A1-3 | 69.6 | A1-10 | 69.0 | A1-17 | 68.6 |
| 25 | A1-3 | 69.1 | A1-10 | 68.5 | A1-17 | 68.3 |
| 31 | A1-3 | 68.7 | A1-10 | 68.1 | A1-17 | 68.0 |
| 37 | A1-3 | 68.6 | A1-10 | 68.1 | A1-17 | 67.7 |
| 1 | A1-4 | 63.9 | A1-11 | 69.0 | A1-18 | 66.9 |
| 7 | A1-4 | 65.4 | A1-11 | 68.5 | A1-18 | 67.9 |
| 13 | A1-4 | 64.5 | A1-11 | 68.0 | A1-18 | 68.0 |
| 19 | A1-4 | 63.9 | A1-11 | 67.4 | A1-18 | 67.8 |
| 25 | A1-4 | 63.3 | A1-11 | 66.9 | A1-18 | 67.6 |
| 31 | A1-4 | 62.8 | A1-11 | 66.3 | A1-18 | 67.4 |
| 37 | A1-4 | 62.4 | A1-11 | 65.9 | A1-18 | 67.2 |
| 1 | A1-5 | 64.2 | A1-12 | 70.1 | A1-19 | 69.1 |
| 7 | A1-5 | 68.0 | A1-12 | 70.1 | A1-19 | 67.8 |
| 13 | A1-5 | 67.5 | A1-12 | 69.6 | A1-19 | 66.4 |
| 19 | A1-5 | 67.1 | A1-12 | 69.1 | A1-19 | 65.3 |
| 25 | A1-5 | 66.8 | A1-12 | 68.7 | A1-19 | 64.4 |
| 31 | A1-5 | 66.5 | A1-12 | 68.2 | A1-19 | 63.7 |
| 37 | A1-5 | 66.5 | A1-12 | 67.8 | A1-19 | 63.1 |
| 1 | A1-6 | 69.7 | A1-13 | 61.7 | A1-20 | 69.7 |
| 7 | A1-6 | 69.8 | A1-13 | 61.6 | A1-20 | 68.0 |
| 13 | A1-6 | 69.1 | A1-13 | 61.1 | A1-20 | 66.7 |
| 19 | A1-6 | 68.6 | A1-13 | 60.8 | A1-20 | 65.9 |
| 25 | A1-6 | 68.2 | A1-13 | 60.3 | A1-20 | 65.3 |
| 31 | A1-6 | 67.9 | A1-13 | 59.9 | A1-20 | 64.8 |
| 37 | A1-6 | 67.8 | A1-13 | 59.5 | A1-20 | 64.6 |
| 1 | A1-7 | 66.2 | A1-14 | 62.2 | A1-21 | 72.7 |
| 7 | A1-7 | 66.4 | A1-14 | 61.7 | A1-21 | 70.1 |
| 13 | A1-7 | 65.6 | A1-14 | 61.2 | A1-21 | 68.2 |
| 19 | A1-7 | 64.9 | A1-14 | 60.9 | A1-21 | 67.0 |
| 25 | A1-7 | 64.2 | A1-14 | 60.5 | A1-21 | 66.0 |
| 31 | A1-7 | 63.7 | A1-14 | 60.1 | A1-21 | 65.3 |
| 37 | A1-7 | 63.3 | A1-14 | 59.7 | A1-21 | 64.6 |

Table A3.1

Noise Assessment for Area 101

| Floor | NSR | Unmitigated dB(A) | NSR | Unmitigated dB(A) | NSR | Unmitigated dB(A) |
|---|---|---|---|---|---|---|
| 1 | A1-22 | 68.7 | | | | |
| 7 | A1-22 | 66.7 | | | | |
| 13 | A1-22 | 65.1 | | | | |
| 19 | A1-22 | 64.2 | | | | |
| 25 | A1-22 | 63.3 | | | | |
| 31 | A1-22 | 62.6 | | | | |
| 37 | A1-22 | 62.3 | | | | |
| 1 | A1-23 | 68.6 | | | | |
| 7 | A1-23 | 67.4 | | | | |
| 13 | A1-23 | 66.0 | | | | |
| 19 | A1-23 | 64.9 | | | | |
| 25 | A1-23 | 63.9 | | | | |
| 31 | A1-23 | 63.1 | | | | |
| 37 | A1-23 | 62.4 | | | | |
| 1 | A1-24 | 66.5 | | | | |
| 7 | A1-24 | 65.8 | | | | |
| 13 | A1-24 | 65.7 | | | | |
| 19 | A1-24 | 65.1 | | | | |
| 25 | A1-24 | 64.4 | | | | |
| 31 | A1-24 | 63.8 | | | | |
| 37 | A1-24 | 63.3 | | | | |
| 1 | A1-25 | 51.3 | | | | |
| 7 | A1-25 | 53.1 | | | | |
| 13 | A1-25 | 63.1 | | | | |
| 19 | A1-25 | 64.1 | | | | |
| 25 | A1-25 | 63.8 | | | | |
| 31 | A1-25 | 63.6 | | | | |
| 37 | A1-25 | 63.3 | | | | |
| 1 | A1-26 | 61.3 | | | | |
| 7 | A1-26 | 63.0 | | | | |
| 13 | A1-26 | 63.5 | | | | |
| 19 | A1-26 | 63.5 | | | | |
| 25 | A1-26 | 63.3 | | | | |
| 31 | A1-26 | 63.1 | | | | |
| 37 | A1-26 | 62.9 | | | | |
| 1 | A1-27 | 61.6 | | | | |
| 7 | A1-27 | 63.5 | | | | |
| 13 | A1-27 | 63.8 | | | | |
| 19 | A1-27 | 63.7 | | | | |
| 25 | A1-27 | 63.5 | | | | |
| 31 | A1-27 | 63.2 | | | | |
| 37 | A1-27 | 63.0 | | | | |
| 1 | A1-28 | 64.8 | | | | |
| 7 | A1-28 | 65.5 | | | | |
| 13 | A1-28 | 65.2 | | | | |
| 19 | A1-28 | 64.9 | | | | |
| 25 | A1-28 | 64.7 | | | | |
| 31 | A1-28 | 64.3 | | | | |
| 37 | A1-28 | 64.1 | | | | |

Table A3.2
Noise Assessment for Area 102

| NSR | Floor | Unmitigated Contributions dB(A) | | | Unmitigated | |
|---|---|---|---|---|---|---|
| | | Tsuen Wan Road | On-ramp | Others | Cumulative | > 70 dB(A) |
| A2-1 | 1 | 63.4 | 2.5 | 72.4 | 72.9 | Y |
| A2-1 | 7 | 64.0 | 2.5 | 71.9 | 72.6 | Y |
| A2-1 | 13 | 64.0 | 2.5 | 71.4 | 72.1 | Y |
| A2-1 | 19 | 64.0 | 2.5 | 70.8 | 71.6 | Y |
| A2-1 | 25 | 64.2 | 2.5 | 70.2 | 71.2 | Y |
| A2-1 | 31 | 65.4 | 2.5 | 69.7 | 71.0 | Y |
| A2-1 | 37 | 66.2 | 2.5 | 69.2 | 70.9 | Y |
| A2-2 | 1 | 68.2 | 54.8 | 70.0 | 72.3 | Y |
| A2-2 | 7 | 68.6 | 54.7 | 69.6 | 72.2 | Y |
| A2-2 | 13 | 68.6 | 54.4 | 69.2 | 72.0 | Y |
| A2-2 | 19 | 68.6 | 54.2 | 68.7 | 71.7 | Y |
| A2-2 | 25 | 68.6 | 53.9 | 68.3 | 71.5 | Y |
| A2-2 | 31 | 69.1 | 53.6 | 67.8 | 71.6 | Y |
| A2-2 | 37 | 69.4 | 53.4 | 67.4 | 71.6 | Y |
| A2-3 | 1 | 63.0 | 2.5 | 70.0 | 70.8 | Y |
| A2-3 | 7 | 63.5 | 2.5 | 69.7 | 70.7 | Y |
| A2-3 | 13 | 63.6 | 2.5 | 69.3 | 70.3 | |
| A2-3 | 19 | 63.6 | 2.5 | 68.8 | 69.9 | |
| A2-3 | 25 | 63.8 | 2.5 | 68.3 | 69.6 | |
| A2-3 | 31 | 65.4 | 2.5 | 67.8 | 69.8 | |
| A2-3 | 37 | 66.1 | 2.5 | 67.3 | 69.8 | |
| A2-4 | 1 | 63.5 | 2.5 | 66.3 | 68.2 | |
| A2-4 | 7 | 63.7 | 2.5 | 66.6 | 68.4 | |
| A2-4 | 13 | 63.7 | 2.5 | 66.3 | 68.2 | |
| A2-4 | 19 | 63.8 | 2.5 | 65.9 | 68.0 | |
| A2-4 | 25 | 63.8 | 2.5 | 65.6 | 67.8 | |
| A2-4 | 31 | 65.1 | 2.5 | 65.2 | 68.2 | |
| A2-4 | 37 | 66.0 | 2.5 | 64.8 | 68.4 | |
| A2-5 | 1 | 68.6 | 55.3 | 67.7 | 71.3 | Y |
| A2-5 | 7 | 69.0 | 55.4 | 68.2 | 71.7 | Y |
| A2-5 | 13 | 69.0 | 55.2 | 67.9 | 71.6 | Y |
| A2-5 | 19 | 69.0 | 55.1 | 67.6 | 71.4 | Y |
| A2-5 | 25 | 68.9 | 54.9 | 67.3 | 71.3 | Y |
| A2-5 | 31 | 69.3 | 54.6 | 67.0 | 71.4 | Y |
| A2-5 | 37 | 69.6 | 54.4 | 66.7 | 71.5 | Y |
| A2-6 | 1 | 67.5 | 55.0 | 62.3 | 68.9 | |
| A2-6 | 7 | 67.9 | 55.4 | 62.4 | 69.1 | |
| A2-6 | 13 | 67.9 | 55.2 | 62.3 | 69.1 | |
| A2-6 | 19 | 67.8 | 55.0 | 62.1 | 69.0 | |
| A2-6 | 25 | 67.8 | 54.8 | 61.9 | 68.9 | |
| A2-6 | 31 | 67.7 | 54.6 | 61.9 | 68.9 | |
| A2-6 | 37 | 67.6 | 54.4 | 61.7 | 68.7 | |
| A2-7 | 1 | 68.0 | 54.7 | 64.6 | 69.8 | |
| A2-7 | 7 | 68.4 | 55.2 | 64.6 | 70.0 | |
| A2-7 | 13 | 68.4 | 55.1 | 64.4 | 70.0 | |
| A2-7 | 19 | 68.3 | 54.9 | 64.3 | 69.9 | |
| A2-7 | 25 | 68.3 | 54.7 | 64.1 | 69.8 | |
| A2-7 | 31 | 68.2 | 54.5 | 63.8 | 69.7 | |
| A2-7 | 37 | 68.1 | 54.3 | 63.7 | 69.6 | |
| A2-8 | 1 | 59.4 | 2.5 | 64.2 | 65.5 | |
| A2-8 | 7 | 60.1 | 2.5 | 65.1 | 66.3 | |
| A2-8 | 13 | 60.2 | 2.5 | 65.0 | 66.2 | |
| A2-8 | 19 | 60.2 | 2.5 | 64.7 | 66.0 | |
| A2-8 | 25 | 60.4 | 2.5 | 64.4 | 65.9 | |
| A2-8 | 31 | 62.0 | 2.5 | 64.1 | 66.2 | |
| A2-8 | 37 | 63.7 | 2.5 | 63.8 | 66.8 | |
| A2-9 | 1 | 61.0 | 2.5 | 64.3 | 66.0 | |

Table A3.2

Noise Assessment for Area 102

| NSR | Floor | Unmitigated Contributions dB(A) Tsuen Wan Road | On-ramp | Others | Unmitigated Cumulative | > 70 dB(A) |
|---|---|---|---|---|---|---|
| A2-9 | 7 | 61.4 | 2.5 | 64.8 | 66.5 | |
| A2-9 | 13 | 61.5 | 2.5 | 64.8 | 66.5 | |
| A2-9 | 19 | 61.5 | 2.5 | 64.6 | 66.3 | |
| A2-9 | 25 | 61.5 | 2.5 | 64.4 | 66.2 | |
| A2-9 | 31 | 62.5 | 2.5 | 64.1 | 66.4 | |
| A2-9 | 37 | 64.0 | 2.5 | 63.8 | 66.9 | |
| A2-10 | 1 | 67.8 | 55.2 | 61.9 | 68.9 | |
| A2-10 | 7 | 68.1 | 55.8 | 62.1 | 69.3 | |
| A2-10 | 13 | 68.1 | 55.6 | 62.1 | 69.3 | |
| A2-10 | 19 | 68.1 | 55.4 | 61.9 | 69.2 | |
| A2-10 | 25 | 68.0 | 55.2 | 61.8 | 69.1 | |
| A2-10 | 31 | 67.9 | 55.0 | 61.9 | 69.1 | |
| A2-10 | 37 | 67.8 | 54.8 | 61.7 | 68.9 | |
| A2-11 | 1 | 68.3 | 55.0 | 64.4 | 69.9 | |
| A2-11 | 7 | 68.6 | 55.6 | 64.6 | 70.2 | |
| A2-11 | 13 | 68.6 | 55.4 | 64.6 | 70.2 | |
| A2-11 | 19 | 68.6 | 55.3 | 64.4 | 70.1 | |
| A2-11 | 25 | 68.5 | 55.1 | 64.3 | 70.0 | |
| A2-11 | 31 | 68.4 | 54.9 | 64.2 | 70.0 | |
| A2-11 | 37 | 68.4 | 54.7 | 64.0 | 69.8 | |
| A2-12 | 1 | 53.1 | 2.5 | 61.7 | 62.3 | |
| A2-12 | 7 | 55.1 | 2.5 | 62.5 | 63.2 | |
| A2-12 | 13 | 55.2 | 2.5 | 62.8 | 63.5 | |
| A2-12 | 19 | 55.4 | 2.5 | 62.6 | 63.4 | |
| A2-12 | 25 | 55.6 | 2.5 | 62.4 | 63.2 | |
| A2-12 | 31 | 57.7 | 2.5 | 62.2 | 63.5 | |
| A2-12 | 37 | 60.8 | 2.5 | 61.9 | 64.4 | |
| A2-13 | 1 | 68.9 | 55.7 | 66.1 | 70.9 | Y |
| A2-13 | 7 | 69.2 | 55.9 | 66.4 | 71.2 | Y |
| A2-13 | 13 | 69.3 | 55.8 | 66.5 | 71.2 | Y |
| A2-13 | 19 | 69.2 | 55.7 | 66.3 | 71.1 | Y |
| A2-13 | 25 | 69.1 | 55.5 | 66.2 | 71.0 | Y |
| A2-13 | 31 | 69.2 | 55.2 | 66.0 | 71.0 | Y |
| A2-13 | 37 | 69.4 | 55.0 | 65.8 | 71.1 | Y |
| A2-14 | 1 | 68.8 | 55.7 | 64.4 | 70.3 | |
| A2-14 | 7 | 69.1 | 55.9 | 64.7 | 70.6 | Y |
| A2-14 | 13 | 69.1 | 55.8 | 64.7 | 70.6 | Y |
| A2-14 | 19 | 69.0 | 55.7 | 64.5 | 70.5 | |
| A2-14 | 25 | 68.9 | 55.5 | 64.3 | 70.4 | |
| A2-14 | 31 | 68.9 | 55.3 | 64.3 | 70.3 | |
| A2-14 | 37 | 68.8 | 55.0 | 64.1 | 70.2 | |
| A2-15 | 1 | 69.3 | 56.0 | 64.4 | 70.7 | Y |
| A2-15 | 7 | 69.5 | 56.4 | 64.9 | 70.9 | Y |
| A2-15 | 13 | 69.5 | 56.3 | 65.0 | 71.0 | Y |
| A2-15 | 19 | 69.4 | 56.1 | 64.9 | 70.9 | Y |
| A2-15 | 25 | 69.3 | 55.9 | 64.7 | 70.8 | Y |
| A2-15 | 31 | 69.2 | 55.7 | 64.6 | 70.7 | Y |
| A2-15 | 37 | 69.1 | 55.5 | 64.4 | 70.5 | Y |
| A2-16 | 1 | 69.2 | 55.9 | 65.3 | 70.8 | Y |
| A2-16 | 7 | 69.4 | 56.2 | 65.7 | 71.1 | Y |
| A2-16 | 13 | 69.4 | 56.1 | 65.7 | 71.1 | Y |
| A2-16 | 19 | 69.4 | 55.9 | 65.6 | 71.0 | Y |
| A2-16 | 25 | 69.3 | 55.8 | 65.4 | 70.9 | Y |
| A2-16 | 31 | 69.3 | 55.5 | 65.3 | 70.9 | Y |
| A2-16 | 37 | 69.4 | 55.3 | 65.1 | 70.9 | Y |
| A2-17 | 1 | 67.0 | 22.5 | 64.9 | 69.1 | |
| A2-17 | 7 | 67.0 | 22.4 | 65.1 | 69.2 | |

Table A3.2

Noise Assessment for Area 102

| NSR | Floor | Unmitigated Contributions dB(A) Tsuen Wan Road | On-ramp | Others | Unmitigated Cumulative | > 70 dB(A) |
|---|---|---|---|---|---|---|
| A2-17 | 13 | 67.0 | 22.2 | 65.2 | 69.2 | |
| A2-17 | 19 | 66.9 | 21.9 | 65.1 | 69.1 | |
| A2-17 | 25 | 66.9 | 21.7 | 64.9 | 69.0 | |
| A2-17 | 31 | 66.9 | 21.4 | 64.7 | 68.9 | |
| A2-17 | 37 | 67.1 | 21.1 | 64.5 | 69.0 | |
| A2-18 | 1 | 54.2 | 2.5 | 62.8 | 63.4 | |
| A2-18 | 7 | 55.3 | 2.5 | 63.5 | 64.1 | |
| A2-18 | 13 | 55.4 | 2.5 | 63.8 | 64.4 | |
| A2-18 | 19 | 55.5 | 2.5 | 63.7 | 64.3 | |
| A2-18 | 25 | 55.5 | 2.5 | 63.5 | 64.1 | |
| A2-18 | 31 | 56.6 | 2.5 | 63.2 | 64.1 | |
| A2-18 | 37 | 59.0 | 2.5 | 63.0 | 64.5 | |
| A2-19 | 1 | 58.8 | 2.5 | 63.0 | 64.4 | |
| A2-19 | 7 | 59.1 | 2.5 | 63.3 | 64.7 | |
| A2-19 | 13 | 59.1 | 2.5 | 63.4 | 64.7 | |
| A2-19 | 19 | 59.1 | 2.5 | 63.3 | 64.7 | |
| A2-19 | 25 | 59.0 | 2.5 | 63.1 | 64.5 | |
| A2-19 | 31 | 59.8 | 2.5 | 62.9 | 64.7 | |
| A2-19 | 37 | 61.0 | 2.5 | 62.7 | 65.0 | |
| A2-20 | 1 | 70.7 | 57.4 | 66.9 | 72.4 | Y |
| A2-20 | 7 | 70.9 | 57.9 | 67.1 | 72.6 | Y |
| A2-20 | 13 | 70.9 | 57.7 | 67.0 | 72.5 | Y |
| A2-20 | 19 | 70.8 | 57.5 | 67.0 | 72.4 | Y |
| A2-20 | 25 | 70.7 | 57.3 | 66.8 | 72.3 | Y |
| A2-20 | 31 | 70.6 | 57.1 | 66.6 | 72.2 | Y |
| A2-20 | 37 | 70.6 | 56.8 | 66.4 | 72.1 | Y |
| A2-21 | 1 | 70.6 | 57.3 | 65.0 | 71.8 | Y |
| A2-21 | 7 | 70.7 | 57.8 | 65.1 | 72.0 | Y |
| A2-21 | 13 | 70.7 | 57.7 | 64.9 | 71.9 | Y |
| A2-21 | 19 | 70.6 | 57.5 | 65.0 | 71.8 | Y |
| A2-21 | 25 | 70.5 | 57.3 | 64.7 | 71.7 | Y |
| A2-21 | 31 | 70.3 | 57.0 | 64.5 | 71.5 | Y |
| A2-21 | 37 | 70.2 | 56.8 | 64.3 | 71.3 | Y |
| A2-22 | 1 | 67.0 | 22.1 | 64.8 | 69.1 | |
| A2-22 | 7 | 67.1 | 22.0 | 64.9 | 69.1 | |
| A2-22 | 13 | 67.0 | 21.8 | 64.7 | 69.0 | |
| A2-22 | 19 | 66.9 | 21.6 | 64.5 | 68.9 | |
| A2-22 | 25 | 66.8 | 21.3 | 64.3 | 68.8 | |
| A2-22 | 31 | 66.8 | 21.0 | 64.1 | 68.7 | |
| A2-22 | 37 | 66.8 | 20.8 | 63.9 | 68.6 | |
| A2-23 | 1 | 53.6 | 2.5 | 61.6 | 62.2 | |
| A2-23 | 7 | 54.4 | 2.5 | 62.0 | 62.7 | |
| A2-23 | 13 | 54.5 | 2.5 | 62.4 | 63.0 | |
| A2-23 | 19 | 54.5 | 2.5 | 62.3 | 63.0 | |
| A2-23 | 25 | 54.5 | 2.5 | 62.1 | 62.8 | |
| A2-23 | 31 | 56.2 | 2.5 | 62.0 | 63.0 | |
| A2-23 | 37 | 57.5 | 2.5 | 61.8 | 63.1 | |
| A2-24 | 1 | 71.0 | 57.6 | 66.3 | 72.4 | Y |
| A2-24 | 7 | 71.2 | 58.2 | 66.2 | 72.6 | Y |
| A2-24 | 13 | 71.1 | 58.1 | 66.2 | 72.5 | Y |
| A2-24 | 19 | 71.0 | 57.9 | 65.9 | 72.3 | Y |
| A2-24 | 25 | 70.8 | 57.6 | 65.7 | 72.2 | Y |
| A2-24 | 31 | 70.7 | 57.3 | 65.4 | 71.9 | Y |
| A2-24 | 37 | 70.5 | 57.0 | 65.1 | 71.7 | Y |
| A2-25 | 1 | 71.6 | 58.4 | 66.9 | 73.0 | Y |
| A2-25 | 7 | 71.7 | 59.2 | 66.8 | 73.1 | Y |
| A2-25 | 13 | 71.6 | 59.0 | 66.7 | 73.0 | Y |

Table A3.2

Noise Assessment for Area 102

| NSR | Floor | Unmitigated Contributions dB(A) | | | Unmitigated | |
|---|---|---|---|---|---|---|
| | | Tsuen Wan Road | On-ramp | Others | Cumulative | > 70 dB(A) |
| A2-25 | 19 | 71.5 | 58.8 | 66.5 | 72.9 | Y |
| A2-25 | 25 | 71.3 | 58.5 | 66.1 | 72.6 | Y |
| A2-25 | 31 | 71.1 | 58.2 | 65.7 | 72.4 | Y |
| A2-25 | 37 | 70.9 | 57.9 | 65.3 | 72.1 | Y |
| A2-26 | 1 | 65.5 | 23.1 | 64.9 | 68.2 | |
| A2-26 | 7 | 65.5 | 23.0 | 64.7 | 68.1 | |
| A2-26 | 13 | 65.4 | 22.7 | 64.4 | 67.9 | |
| A2-26 | 19 | 65.2 | 22.5 | 64.2 | 67.7 | |
| A2-26 | 25 | 65.0 | 22.2 | 64.0 | 67.5 | |
| A2-26 | 31 | 65.0 | 21.9 | 63.7 | 67.4 | |
| A2-26 | 37 | 64.9 | 21.5 | 63.4 | 67.2 | |
| A2-27 | 1 | 26.0 | 2.5 | 58.6 | 58.6 | |
| A2-27 | 7 | 28.0 | 2.5 | 59.4 | 59.4 | |
| A2-27 | 13 | 30.1 | 2.5 | 59.3 | 59.3 | |
| A2-27 | 19 | 31.2 | 2.5 | 59.3 | 59.3 | |
| A2-27 | 25 | 31.1 | 2.5 | 59.3 | 59.3 | |
| A2-27 | 31 | 30.0 | 2.5 | 59.2 | 59.2 | |
| A2-27 | 37 | 45.1 | 2.5 | 59.0 | 59.2 | |
| A2-28 | 1 | 71.0 | 56.8 | 68.2 | 72.9 | Y |
| A2-28 | 7 | 71.0 | 56.6 | 68.1 | 72.9 | Y |
| A2-28 | 13 | 70.8 | 56.3 | 67.6 | 72.6 | Y |
| A2-28 | 19 | 70.7 | 56.0 | 67.2 | 72.4 | Y |
| A2-28 | 25 | 70.4 | 55.6 | 66.8 | 72.1 | Y |
| A2-28 | 31 | 70.2 | 55.3 | 66.4 | 71.8 | Y |
| A2-28 | 37 | 70.0 | 54.9 | 66.0 | 71.6 | Y |
| A2-29 | 1 | 71.8 | 57.4 | 67.6 | 73.3 | Y |
| A2-29 | 7 | 71.8 | 58.7 | 68.2 | 73.5 | Y |
| A2-29 | 13 | 71.7 | 58.5 | 67.8 | 73.3 | Y |
| A2-29 | 19 | 71.5 | 58.1 | 67.3 | 73.0 | Y |
| A2-29 | 25 | 71.2 | 57.8 | 66.7 | 72.7 | Y |
| A2-29 | 31 | 71.0 | 57.4 | 66.3 | 72.4 | Y |
| A2-29 | 37 | 70.8 | 57.0 | 65.8 | 72.1 | Y |
| A2-30 | 1 | 75.3 | 63.2 | 68.6 | 76.3 | Y |
| A2-30 | 7 | 75.2 | 63.1 | 71.4 | 76.9 | Y |
| A2-30 | 13 | 75.0 | 62.8 | 70.6 | 76.5 | Y |
| A2-30 | 19 | 74.7 | 62.5 | 69.8 | 76.1 | Y |
| A2-30 | 25 | 74.4 | 62.2 | 69.1 | 75.7 | Y |
| A2-30 | 31 | 74.1 | 61.8 | 68.5 | 75.3 | Y |
| A2-30 | 37 | 73.7 | 61.5 | 68.0 | 75.0 | Y |
| A2-31 | 1 | 73.6 | 61.5 | 70.1 | 75.4 | Y |
| A2-31 | 7 | 73.6 | 61.3 | 70.5 | 75.5 | Y |
| A2-31 | 13 | 73.3 | 61.0 | 69.6 | 75.0 | Y |
| A2-31 | 19 | 73.0 | 60.6 | 68.9 | 74.6 | Y |
| A2-31 | 25 | 72.7 | 60.2 | 68.2 | 74.2 | Y |
| A2-31 | 31 | 72.3 | 59.8 | 67.7 | 73.8 | Y |
| A2-31 | 37 | 72.0 | 59.4 | 67.2 | 73.4 | Y |
| A2-32 | 1 | 77.3 | 66.8 | 74.4 | 79.4 | Y |
| A2-32 | 7 | 77.3 | 66.7 | 73.5 | 79.0 | Y |
| A2-32 | 13 | 77.0 | 66.4 | 72.4 | 78.6 | Y |
| A2-32 | 19 | 76.7 | 66.1 | 71.5 | 78.1 | Y |
| A2-32 | 25 | 76.3 | 65.8 | 70.8 | 77.7 | Y |
| A2-32 | 31 | 75.9 | 65.4 | 70.1 | 77.2 | Y |
| A2-32 | 37 | 75.5 | 65.1 | 69.6 | 76.8 | Y |
| A2-33 | 1 | 2.5 | 2.5 | 69.8 | 69.8 | |
| A2-33 | 7 | 2.5 | 2.5 | 70.0 | 70.0 | |
| A2-33 | 13 | 2.5 | 2.5 | 69.4 | 69.4 | |
| A2-33 | 19 | 2.5 | 2.5 | 68.7 | 68.7 | |

Table A3.2
Noise Assessment for Area 102

| NSR | Floor | Unmitigated Contributions dB(A) | | | Unmitigated | |
|---|---|---|---|---|---|---|
| | | Tsuen Wan Road | On-ramp | Others | Cumulative | > 70 dB(A) |
| A2-33 | 25 | 2.5 | 2.5 | 68.1 | 68.1 | |
| A2-33 | 31 | 2.5 | 2.5 | 67.5 | 67.5 | |
| A2-33 | 37 | 2.5 | 2.5 | 67.0 | 67.0 | |
| A2-34 | 1 | 57.6 | 2.5 | 70.5 | 70.7 | Y |
| A2-34 | 7 | 59.4 | 2.5 | 70.6 | 70.9 | Y |
| A2-34 | 13 | 59.4 | 2.5 | 70.0 | 70.3 | |
| A2-34 | 19 | 59.6 | 2.5 | 69.4 | 69.8 | |
| A2-34 | 25 | 59.9 | 2.5 | 68.8 | 69.3 | |
| A2-34 | 31 | 61.6 | 2.5 | 68.3 | 69.1 | |
| A2-34 | 37 | 63.4 | 2.5 | 67.8 | 69.1 | |
| A2-35 | 1 | 2.5 | 2.5 | 69.3 | 69.3 | |
| A2-35 | 7 | 2.5 | 2.5 | 69.5 | 69.5 | |
| A2-35 | 13 | 2.5 | 2.5 | 68.8 | 68.8 | |
| A2-35 | 19 | 2.5 | 2.5 | 68.2 | 68.2 | |
| A2-35 | 25 | 2.5 | 2.5 | 67.6 | 67.6 | |
| A2-35 | 31 | 2.5 | 2.5 | 67.1 | 67.1 | |
| A2-35 | 37 | 2.5 | 2.5 | 66.6 | 66.6 | |
| A2-36 | 1 | 2.5 | 2.5 | 63.7 | 63.7 | |
| A2-36 | 7 | 2.5 | 2.5 | 67.2 | 67.2 | |
| A2-36 | 13 | 2.5 | 2.5 | 66.5 | 66.5 | |
| A2-36 | 19 | 2.5 | 2.5 | 65.9 | 65.9 | |
| A2-36 | 25 | 2.5 | 2.5 | 65.4 | 65.4 | |
| A2-36 | 31 | 2.5 | 2.5 | 64.9 | 64.9 | |
| A2-36 | 37 | 2.5 | 2.5 | 64.4 | 64.4 | |
| A2-37 | 1 | 21.6 | 22.3 | 68.2 | 68.2 | |
| A2-37 | 7 | 21.6 | 22.3 | 68.2 | 68.2 | |
| A2-37 | 13 | 21.6 | 22.3 | 67.5 | 67.5 | |
| A2-37 | 19 | 21.5 | 22.3 | 66.8 | 66.8 | |
| A2-37 | 25 | 21.5 | 22.2 | 66.2 | 66.2 | |
| A2-37 | 31 | 21.4 | 22.2 | 65.7 | 65.7 | |
| A2-37 | 37 | 23.1 | 23.3 | 65.2 | 65.2 | |
| A2-38 | 1 | 37.5 | 29.5 | 65.2 | 65.2 | |
| A2-38 | 7 | 37.5 | 29.5 | 65.7 | 65.7 | |
| A2-38 | 13 | 37.4 | 29.4 | 64.9 | 64.9 | |
| A2-38 | 19 | 37.4 | 29.4 | 64.1 | 64.1 | |
| A2-38 | 25 | 37.3 | 29.3 | 63.5 | 63.5 | |
| A2-38 | 31 | 37.2 | 29.3 | 62.9 | 62.9 | |
| A2-38 | 37 | 37.4 | 29.9 | 62.3 | 62.3 | |
| A2-39 | 1 | 23.6 | 22.8 | 62.7 | 62.7 | |
| A2-39 | 7 | 23.5 | 22.8 | 66.2 | 66.2 | |
| A2-39 | 13 | 23.5 | 22.8 | 65.4 | 65.4 | |
| A2-39 | 19 | 23.4 | 22.7 | 64.6 | 64.6 | |
| A2-39 | 25 | 23.4 | 22.7 | 63.9 | 63.9 | |
| A2-39 | 31 | 23.3 | 22.6 | 63.4 | 63.4 | |
| A2-39 | 37 | 24.0 | 23.3 | 62.8 | 62.8 | |
| A2-40 | 1 | 29.6 | 2.5 | 67.2 | 67.2 | |
| A2-40 | 7 | 29.6 | 2.5 | 66.9 | 66.9 | |
| A2-40 | 13 | 29.6 | 2.5 | 66.1 | 66.1 | |
| A2-40 | 19 | 29.6 | 2.5 | 65.3 | 65.3 | |
| A2-40 | 25 | 29.6 | 2.5 | 64.7 | 64.7 | |
| A2-40 | 31 | 29.6 | 2.5 | 64.1 | 64.1 | |
| A2-40 | 37 | 31.7 | 2.5 | 63.6 | 63.6 | |
| A2-41 | 1 | 38.6 | 30.4 | 66.7 | 66.7 | |
| A2-41 | 7 | 38.6 | 30.4 | 65.9 | 65.9 | |
| A2-41 | 13 | 38.6 | 30.4 | 64.8 | 64.9 | |
| A2-41 | 19 | 38.5 | 30.3 | 64.0 | 64.0 | |
| A2-41 | 25 | 38.4 | 30.3 | 63.4 | 63.4 | |

Table A3.2

Noise Assessment for Area 102

| NSR | Floor | Unmitigated Contributions dB(A) Tsuen Wan Road | On-ramp | Others | Unmitigated Cumulative | > 70 dB(A) |
|---|---|---|---|---|---|---|
| A2-41 | 31 | 38.4 | 30.3 | 62.8 | 62.8 | |
| A2-41 | 37 | 38.4 | 30.2 | 62.3 | 62.3 | |
| A2-42 | 1 | 56.2 | 47.0 | 69.9 | 70.1 | |
| A2-42 | 7 | 56.8 | 48.8 | 69.0 | 69.3 | |
| A2-42 | 13 | 56.8 | 48.7 | 68.1 | 68.5 | |
| A2-42 | 19 | 56.7 | 48.7 | 67.3 | 67.7 | |
| A2-42 | 25 | 56.6 | 48.7 | 66.7 | 67.1 | |
| A2-42 | 31 | 56.6 | 48.6 | 66.1 | 66.6 | |
| A2-42 | 37 | 56.5 | 48.5 | 65.5 | 66.1 | |
| A2-43 | 1 | 60.2 | 52.1 | 70.0 | 70.5 | Y |
| A2-43 | 7 | 60.3 | 52.3 | 69.2 | 69.8 | |
| A2-43 | 13 | 60.4 | 52.3 | 68.4 | 69.1 | |
| A2-43 | 19 | 60.3 | 52.3 | 67.6 | 68.5 | |
| A2-43 | 25 | 60.2 | 52.2 | 67.0 | 67.9 | |
| A2-43 | 31 | 60.1 | 52.1 | 66.4 | 67.5 | |
| A2-43 | 37 | 59.9 | 52.0 | 65.9 | 67.0 | |
| A2-44 | 1 | 18.7 | 2.5 | 66.9 | 66.9 | |
| A2-44 | 7 | 18.7 | 2.5 | 66.1 | 66.1 | |
| A2-44 | 13 | 18.7 | 2.5 | 65.1 | 65.1 | |
| A2-44 | 19 | 18.7 | 2.5 | 64.3 | 64.3 | |
| A2-44 | 25 | 18.7 | 2.5 | 63.6 | 63.6 | |
| A2-44 | 31 | 18.6 | 2.5 | 63.0 | 63.0 | |
| A2-44 | 37 | 20.5 | 2.5 | 62.5 | 62.5 | |
| A2-45 | 1 | 60.6 | 52.6 | 66.7 | 67.8 | |
| A2-45 | 7 | 60.7 | 52.6 | 66.5 | 67.7 | |
| A2-45 | 13 | 60.7 | 52.6 | 65.7 | 67.1 | |
| A2-45 | 19 | 60.6 | 52.5 | 65.0 | 66.5 | |
| A2-45 | 25 | 60.5 | 52.4 | 64.3 | 66.0 | |
| A2-45 | 31 | 60.4 | 52.3 | 63.7 | 65.6 | |
| A2-45 | 37 | 60.2 | 52.2 | 63.2 | 65.2 | |
| A2-46 | 1 | 35.2 | 29.0 | 63.8 | 63.9 | |
| A2-46 | 7 | 35.1 | 28.9 | 68.1 | 68.1 | |
| A2-46 | 13 | 35.0 | 28.8 | 67.2 | 67.2 | |
| A2-46 | 19 | 34.9 | 28.7 | 66.3 | 66.3 | |
| A2-46 | 25 | 34.8 | 28.6 | 65.6 | 65.6 | |
| A2-46 | 31 | 34.7 | 28.7 | 65.0 | 65.0 | |
| A2-46 | 37 | 34.5 | 28.3 | 64.5 | 64.5 | |
| A2-47 | 1 | 2.5 | 2.5 | 66.1 | 66.1 | |
| A2-47 | 7 | 2.5 | 2.5 | 67.4 | 67.4 | |
| A2-47 | 13 | 2.5 | 2.5 | 66.5 | 66.5 | |
| A2-47 | 19 | 2.5 | 2.5 | 65.6 | 65.6 | |
| A2-47 | 25 | 2.5 | 2.5 | 64.8 | 64.8 | |
| A2-47 | 31 | 2.5 | 2.5 | 64.2 | 64.2 | |
| A2-47 | 37 | 2.5 | 2.5 | 63.7 | 63.7 | |
| A2-48 | 1 | 68.2 | 58.6 | 69.9 | 72.3 | Y |
| A2-48 | 7 | 68.2 | 59.0 | 69.5 | 72.2 | Y |
| A2-48 | 13 | 68.2 | 59.0 | 68.7 | 71.7 | Y |
| A2-48 | 19 | 68.1 | 58.9 | 67.9 | 71.3 | Y |
| A2-48 | 25 | 67.9 | 58.8 | 67.3 | 70.9 | Y |
| A2-48 | 31 | 67.7 | 58.6 | 66.7 | 70.5 | Y |
| A2-48 | 37 | 67.6 | 58.4 | 66.2 | 70.2 | |
| A2-49 | 1 | 73.7 | 64.4 | 71.9 | 76.2 | Y |
| A2-49 | 7 | 73.8 | 64.5 | 71.3 | 76.0 | Y |
| A2-49 | 13 | 73.6 | 64.3 | 70.5 | 75.7 | Y |
| A2-49 | 19 | 73.4 | 64.1 | 69.8 | 75.3 | Y |
| A2-49 | 25 | 73.1 | 63.8 | 69.1 | 74.9 | Y |
| A2-49 | 31 | 72.9 | 63.6 | 68.5 | 74.6 | Y |

Table A3.2

Noise Assessment for Area 102

| NSR | Floor | Unmitigated Contributions dB(A) Tsuen Wan Road | On-ramp | Others | Unmitigated Cumulative | > 70 dB(A) |
|---|---|---|---|---|---|---|
| A2-49 | 37 | 72.6 | 63.3 | 67.9 | 74.2 | Y |
| A2-50 | 1 | 76.0 | 66.4 | 68.8 | 77.2 | Y |
| A2-50 | 7 | 76.0 | 66.3 | 72.0 | 77.8 | Y |
| A2-50 | 13 | 75.7 | 66.0 | 71.1 | 77.3 | Y |
| A2-50 | 19 | 75.5 | 65.8 | 70.2 | 76.9 | Y |
| A2-50 | 25 | 75.1 | 65.5 | 69.5 | 76.5 | Y |
| A2-50 | 31 | 74.8 | 65.2 | 68.9 | 76.1 | Y |
| A2-50 | 37 | 74.4 | 64.9 | 68.3 | 75.7 | Y |
| A2-51 | 1 | 75.4 | 65.8 | 70.5 | 77.0 | Y |
| A2-51 | 7 | 75.3 | 65.7 | 71.8 | 77.2 | Y |
| A2-51 | 13 | 75.1 | 65.4 | 70.8 | 76.8 | Y |
| A2-51 | 19 | 74.7 | 65.1 | 69.9 | 76.3 | Y |
| A2-51 | 25 | 74.4 | 64.8 | 69.1 | 75.9 | Y |
| A2-51 | 31 | 74.0 | 64.5 | 68.5 | 75.4 | Y |
| A2-51 | 37 | 73.6 | 64.2 | 67.9 | 75.0 | Y |

## Table A3.3
Noise Assessment for Area 103

| Floor | NSR | Unmitigated dB(A) | NSR | Unmitigated dB(A) | NSR | Unmitigated dB(A) |
|---|---|---|---|---|---|---|
| 1 | A3-1 | 66.5 | A3-9 | 57.7 | A3-17 | 70.3 |
| 7 | A3-1 | 70.3 | A3-9 | 67.0 | A3-17 | 68.7 |
| 13 | A3-1 | 69.8 | A3-9 | 67.4 | A3-17 | 67.5 |
| 19 | A3-1 | 69.4 | A3-9 | 67.3 | A3-17 | 66.6 |
| 25 | A3-1 | 69.1 | A3-9 | 67.0 | A3-17 | 66.3 |
| 31 | A3-1 | 68.8 | A3-9 | 66.8 | A3-17 | 65.9 |
| 37 | A3-1 | 68.5 | A3-9 | 66.6 | A3-17 | 65.4 |
| 1 | A3-2 | 65.6 | A3-10 | 60.6 | A3-18 | 69.4 |
| 7 | A3-2 | 67.6 | A3-10 | 64.4 | A3-18 | 67.6 |
| 13 | A3-2 | 67.7 | A3-10 | 64.8 | A3-18 | 66.0 |
| 19 | A3-2 | 67.4 | A3-10 | 65.0 | A3-18 | 64.8 |
| 25 | A3-2 | 67.0 | A3-10 | 64.9 | A3-18 | 64.5 |
| 31 | A3-2 | 66.6 | A3-10 | 64.7 | A3-18 | 64.0 |
| 37 | A3-2 | 66.2 | A3-10 | 64.5 | A3-18 | 63.5 |
| 1 | A3-3 | 64.6 | A3-11 | 64.8 | | |
| 7 | A3-3 | 65.2 | A3-11 | 65.0 | | |
| 13 | A3-3 | 65.2 | A3-11 | 65.0 | | |
| 19 | A3-3 | 64.9 | A3-11 | 64.7 | | |
| 25 | A3-3 | 64.5 | A3-11 | 64.2 | | |
| 31 | A3-3 | 64.1 | A3-11 | 63.8 | | |
| 37 | A3-3 | 63.7 | A3-11 | 63.5 | | |
| 1 | A3-4 | 54.4 | A3-12 | 65.1 | | |
| 7 | A3-4 | 63.2 | A3-12 | 65.1 | | |
| 13 | A3-4 | 64.4 | A3-12 | 64.7 | | |
| 19 | A3-4 | 64.3 | A3-12 | 64.1 | | |
| 25 | A3-4 | 64.0 | A3-12 | 63.5 | | |
| 31 | A3-4 | 63.7 | A3-12 | 63.1 | | |
| 37 | A3-4 | 63.4 | A3-12 | 62.6 | | |
| 1 | A3-5 | 59.7 | A3-13 | 67.1 | | |
| 7 | A3-5 | 61.9 | A3-13 | 66.7 | | |
| 13 | A3-5 | 62.5 | A3-13 | 65.9 | | |
| 19 | A3-5 | 62.8 | A3-13 | 65.3 | | |
| 25 | A3-5 | 62.7 | A3-13 | 64.6 | | |
| 31 | A3-5 | 62.5 | A3-13 | 64.1 | | |
| 37 | A3-5 | 62.3 | A3-13 | 63.7 | | |
| 1 | A3-6 | 67.2 | A3-14 | 66.9 | | |
| 7 | A3-6 | 70.4 | A3-14 | 66.2 | | |
| 13 | A3-6 | 70.1 | A3-14 | 65.3 | | |
| 19 | A3-6 | 69.7 | A3-14 | 64.4 | | |
| 25 | A3-6 | 69.3 | A3-14 | 63.7 | | |
| 31 | A3-6 | 69.0 | A3-14 | 63.0 | | |
| 37 | A3-6 | 68.8 | A3-14 | 62.5 | | |
| 1 | A3-7 | 68.6 | A3-15 | 67.1 | | |
| 7 | A3-7 | 69.8 | A3-15 | 67.4 | | |
| 13 | A3-7 | 69.9 | A3-15 | 67.2 | | |
| 19 | A3-7 | 69.6 | A3-15 | 67.0 | | |
| 25 | A3-7 | 69.3 | A3-15 | 66.6 | | |
| 31 | A3-7 | 69.0 | A3-15 | 66.2 | | |
| 37 | A3-7 | 68.8 | A3-15 | 65.8 | | |
| 1 | A3-8 | 68.4 | A3-16 | 67.4 | | |
| 7 | A3-8 | 68.9 | A3-16 | 67.2 | | |
| 13 | A3-8 | 68.9 | A3-16 | 66.4 | | |
| 19 | A3-8 | 68.6 | A3-16 | 65.7 | | |
| 25 | A3-8 | 68.3 | A3-16 | 65.6 | | |
| 31 | A3-8 | 68.1 | A3-16 | 65.1 | | |
| 37 | A3-8 | 67.9 | A3-16 | 64.7 | | |

Table A3.4
Noise Assessment for Area 104

| Floor | NSR | Unmitigated dB(A) | NSR | Unmitigated dB(A) | NSR | Unmitigated dB(A) |
|---|---|---|---|---|---|---|
| 1 | A4-1 | 75.8 | A4-11 | 72.0 | A4-21 | 70.0 |
| 7 | A4-1 | 77.3 | A4-11 | 70.0 | A4-21 | 71.5 |
| 13 | A4-1 | 77.3 | A4-11 | 68.7 | A4-21 | 71.5 |
| 19 | A4-1 | 77.0 | A4-11 | 67.7 | A4-21 | 71.2 |
| 25 | A4-1 | 76.7 | A4-11 | 66.9 | A4-21 | 70.9 |
| 31 | A4-1 | 76.4 | A4-11 | 66.2 | A4-21 | 70.7 |
| 37 | A4-1 | 76.0 | A4-11 | 65.7 | A4-21 | 70.5 |
| 1 | A4-2 | 75.6 | A4-12 | 71.8 | A4-22 | 66.7 |
| 7 | A4-2 | 76.9 | A4-12 | 69.9 | A4-22 | 68.5 |
| 13 | A4-2 | 76.6 | A4-12 | 68.3 | A4-22 | 68.3 |
| 19 | A4-2 | 76.2 | A4-12 | 67.2 | A4-22 | 67.8 |
| 25 | A4-2 | 75.9 | A4-12 | 66.4 | A4-22 | 67.4 |
| 31 | A4-2 | 75.5 | A4-12 | 65.7 | A4-22 | 67.1 |
| 37 | A4-2 | 75.1 | A4-12 | 65.1 | A4-22 | 66.7 |
| 1 | A4-3 | 78.0 | A4-13 | 65.0 | A4-23 | 72.0 |
| 7 | A4-3 | 79.2 | A4-13 | 65.0 | A4-23 | 74.0 |
| 13 | A4-3 | 78.9 | A4-13 | 64.4 | A4-23 | 74.1 |
| 19 | A4-3 | 78.5 | A4-13 | 63.7 | A4-23 | 74.4 |
| 25 | A4-3 | 78.1 | A4-13 | 62.9 | A4-23 | 74.2 |
| 31 | A4-3 | 77.7 | A4-13 | 62.3 | A4-23 | 74.1 |
| 37 | A4-3 | 77.3 | A4-13 | 61.7 | A4-23 | 73.9 |
| 1 | A4-4 | 74.6 | A4-14 | 64.9 | A4-24 | 70.7 |
| 7 | A4-4 | 76.0 | A4-14 | 65.1 | A4-24 | 72.5 |
| 13 | A4-4 | 75.6 | A4-14 | 64.6 | A4-24 | 72.6 |
| 19 | A4-4 | 75.3 | A4-14 | 63.9 | A4-24 | 73.3 |
| 25 | A4-4 | 74.8 | A4-14 | 63.5 | A4-24 | 73.2 |
| 31 | A4-4 | 74.4 | A4-14 | 62.9 | A4-24 | 73.0 |
| 37 | A4-4 | 74.0 | A4-14 | 62.5 | A4-24 | 73.0 |
| 1 | A4-5 | 75.5 | A4-15 | 65.6 | A4-25 | 69.5 |
| 7 | A4-5 | 77.1 | A4-15 | 65.8 | A4-25 | 71.7 |
| 13 | A4-5 | 77.0 | A4-15 | 66.0 | A4-25 | 71.7 |
| 19 | A4-5 | 76.7 | A4-15 | 65.4 | A4-25 | 71.5 |
| 25 | A4-5 | 76.3 | A4-15 | 65.0 | A4-25 | 71.3 |
| 31 | A4-5 | 76.0 | A4-15 | 64.5 | A4-25 | 71.2 |
| 37 | A4-5 | 75.6 | A4-15 | 64.0 | A4-25 | 71.0 |
| 1 | A4-6 | 73.1 | A4-16 | 50.5 | A4-26 | 68.5 |
| 7 | A4-6 | 74.6 | A4-16 | 52.3 | A4-26 | 70.5 |
| 13 | A4-6 | 74.4 | A4-16 | 63.3 | A4-26 | 70.4 |
| 19 | A4-6 | 74.1 | A4-16 | 64.0 | A4-26 | 70.2 |
| 25 | A4-6 | 73.7 | A4-16 | 63.6 | A4-26 | 70.0 |
| 31 | A4-6 | 73.4 | A4-16 | 63.2 | A4-26 | 69.8 |
| 37 | A4-6 | 73.0 | A4-16 | 62.9 | A4-26 | 69.5 |
| 1 | A4-7 | 65.7 | A4-17 | 65.3 | A4-27 | 71.1 |
| 7 | A4-7 | 66.7 | A4-17 | 65.6 | A4-27 | 73.1 |
| 13 | A4-7 | 66.3 | A4-17 | 65.6 | A4-27 | 75.3 |
| 19 | A4-7 | 66.1 | A4-17 | 65.0 | A4-27 | 75.3 |
| 25 | A4-7 | 65.8 | A4-17 | 64.4 | A4-27 | 75.3 |
| 31 | A4-7 | 65.4 | A4-17 | 63.8 | A4-27 | 75.2 |
| 37 | A4-7 | 65.0 | A4-17 | 63.2 | A4-27 | 75.0 |
| 1 | A4-8 | 68.9 | A4-18 | 67.3 | A4-28 | 70.5 |
| 7 | A4-8 | 70.7 | A4-18 | 66.5 | A4-28 | 72.4 |
| 13 | A4-8 | 70.7 | A4-18 | 65.2 | A4-28 | 75.1 |
| 19 | A4-8 | 70.5 | A4-18 | 64.1 | A4-28 | 75.1 |
| 25 | A4-8 | 70.3 | A4-18 | 63.1 | A4-28 | 75.1 |
| 31 | A4-8 | 70.1 | A4-18 | 62.3 | A4-28 | 74.9 |
| 37 | A4-8 | 69.9 | A4-18 | 61.6 | A4-28 | 74.8 |
| 1 | A4-9 | 72.3 | A4-19 | 68.9 | | |
| 7 | A4-9 | 72.8 | A4-19 | 67.2 | | |
| 13 | A4-9 | 72.3 | A4-19 | 65.6 | | |
| 19 | A4-9 | 71.8 | A4-19 | 64.4 | | |
| 25 | A4-9 | 71.5 | A4-19 | 63.5 | | |
| 31 | A4-9 | 71.2 | A4-19 | 62.7 | | |
| 37 | A4-9 | 70.9 | A4-19 | 62.1 | | |
| 1 | A4-10 | 72.0 | A4-20 | 70.8 | | |
| 7 | A4-10 | 70.2 | A4-20 | 69.1 | | |
| 13 | A4-10 | 68.7 | A4-20 | 67.7 | | |
| 19 | A4-10 | 67.5 | A4-20 | 66.6 | | |
| 25 | A4-10 | 66.5 | A4-20 | 65.7 | | |
| 31 | A4-10 | 65.7 | A4-20 | 65.0 | | |
| 37 | A4-10 | 65.1 | A4-20 | 64.4 | | |

## APPENDIX A4

## INDUSTRIAL NOISE (FIELD LOGS AND CALCULATION DETAILS)

The following two attachments are attached to this Appendix A4:

(i) Field Logs

(ii) Calculation Details

Re-fax on 6/6

| | |
|---|---|
| Job/Ref No. | 97050/Amy 70602.02 |
| From: | Mankie |
| Date Sent: | 2/6/97 |
| To: | CES |
| Attn: | Lawrence |
| Page 1 | of 8 |

CES (Asia) Ltd.
Tsuen Wan Bay Industrial
Noise Monitoring (Day-Time)

**Measurement**

| | | | | | |
|---|---|---|---|---|---|
| Type of B&K Sound Level Meter | | 2231 | Equipment No. | N-001-01A | |
| Location | | 1 (see drawing overleaf) | | | |
| Details of Location | | Sound level meter was placed 1.2m above ground at Hoi Shing Road. The mircophone facing the Golden Bear Industrial Center. | | | |
| Date of Measurement | | 17-5-97 | | | |
| Time of Measurement | From | 1020 | | 1600 | |
| | To | 1120 | | 1700 | |
| Measurement of Leq(30-min), dB(A) | 1 | 76.3 | | 75.6 | |
| | 2 | 78.7 | | 75.5 | |
| | Average | 77.7 | | 75.6 | |
| Wind Speed | | 1.8 ms⁻¹ | | 0.5ms⁻¹ | |
| Measurement Time | | 1030 | | 1600 | |
| Equipment No. | | A-009-01 | | A-009-01 | |
| Calibration | | Before | After | Before | After |
| Type of Calibrator & equipment no | | 4230/N-003-01 | 4230/N-003-01 | 4230/N-003-01 | 4230/N-003-01 |
| Noise Level of Calibrator | | 93.85 | 93.85 | 93.85 | 93.85 |
| Frequency of Signal (KHz) | | 1 | 1 | 1 | 1 |
| Measurement (dB) | | 93.8 | 93.8 | 93.8 | 93.8 |
| No. of Vehicle cross the road during the measurement period | | Heavy Vehicle | Light Vehicle | Heavy Vehicle | Light Vehicle |
| Total No. of Vehicle | | 243 | 323 | 231 | 394 |
| Containers | | ~~40%~~ 40% | | 40% | |
| Coaches | | 10% | | 10% | |
| Lorries | | 50% | | 50% | |
| Taxi | | | | | 10% |
| Van | | | 80% | | 70% |
| Other | | | 20% | | 20% |

Heavy Vehicle : Containers , Coaches and Lorries.
Light Vehicle : Private Car, Van, Taxi, Bike and Mini-bus.

*without checking

Conducted by CWK Date 17-5-97

Checked by ______________ Date ______________

Remark: major noise sources is traffic.

Re-fax on 6/6

| Job/Ref No. | 97050/fmy70602.02 |
|---|---|
| From: | Mankie |
| Date Sent: | 2/6/97 |
| To: | CES |
| Attn: | Lawrence |
| | Page 2 of 8 |

CES (Asia) Ltd.

Tsuen Wan Bay Industrial
Noise Monitoring (Evening)

Measurement

| | | | |
|---|---|---|---|
| Type of B&K Sound Level Meter | 2231 | Equipment No. | N-001-01A |
| Location | | 1 (see drawing overleaf) | |
| Details of Location | | Sound level meter was placed 1.2m above ground at Hoi Shing Road. The mircophone facing the Golden Bear Industrial Center. * | |
| Date of Measurement | | 27-5-97 | |
| Time of Measurement | From | 2230 | |
| | To | 2300 | |
| Measurement of Leq(5 min), dB(A) | 1 | 69.9 | |
| | 2 | 70.1 | |
| | 3 | 70.1 | |
| | 4 | 70.8 | |
| | 5 | 69.7 | |
| | 6 | 70.1 | |
| | Average | 70.1 | |
| ~~Leq(15 min), dB(A)~~ WK | | | |

Attn: Lawrence
From: Mankie
Date: 16-6-97
(Re-fax)
Only 1 Page

| Calibration | | Type of Calibrator & equipment no | Noise Level of Calibrator | Frequency of Signal (KHz) | Measurement (dB) |
|---|---|---|---|---|---|
| | Before | 4230/N-003-01 | 93.85 dB | 1 | 93.8 |
| | After | 4230/N-003-01 | 93.85 dB | 1 | 93.8 |

Wind Speed: 0-2 m/s. Measurement Time: 2233 Equipment no: A-004-01

No. of Vehicle cross the road during the measurement period

| | Heavy Vehicle | Light Vehicle |
|---|---|---|
| Total No. of Vehicle | 3 | 18 |
| Containers | | |
| Coaches | | |
| Lorries | 100% | |
| Taxi | | 90% |
| Van | | |
| Other | | 10% |

Heavy Vehicle: Containers, Coaches, and Lorries.

Light Vehicle: Private Car, Van, Taxi, Bike and Mini-bus.

Remark: The major noise ~~Sou~~ sources from cooling tower tank & ventilator.

Conducted by WK Date 27-5-97

Checked by ______ Date ______

* without checking

Re-fax on 6/6

| | |
|---|---|
| Job/Ref No. | 97050/fmy70602.02 |
| From: | Mankio |
| Date Sent: | 2/6/97 |
| To: | CES |
| Attn: | Lawrence |
| | Page 3 of 8 |

CES (Asia) Ltd.

Tsuen Wan Bay Industrial
Noise Monitoring (Night)

**Measurement**

| | | | |
|---|---|---|---|
| Type of B&K Sound Level Meter | 2231 | Equipment No. | N-001-01A |

| | | | | | |
|---|---|---|---|---|---|
| Location | | 1 (see drawing overleaf) | | | |
| Details of Location | | Sound level meter was placed 1.2m above ground at Hoi Shing Road. The mircophone facing the Golden Bear Industrial Center. | | | |
| Date of Measurement | | 27-5-97 | | | |
| Time of Measurement | From | 2300 | | | |
| | To | 2330 | | | |
| Measurement of Leq(5 min), dB(A) | 1 | 70.5 | | | |
| | 2 | 70.5 | | | |
| | 3 | 70.9 | | | |
| | 4 | 71.8 | | | |
| | 5 | 70.4 | | | |
| | 6 | 70.1 | | | |
| | Average | 70.7 | | | |
| ~~Leq(15 min), dB(A)~~ WK | | | | | |
| Calibration | | Type of Calibrator & equipment no | Noise Level of Calibrator | Frequency of Signal (KHz) | Measurement (dB) |
| | Before | 4230 / N-003-01 | 93.85 dB | 1 | 93.8 |
| | After | 4230 / N-003-01 | 93.85 dB | 1 | 93.8 |

Wind Speed : 0.3 m/s. Measurement Time : 2300 Equipment no : A-008-01

**No. of Vehicle cross the road during the measurement period**

| | Heavy Vehicle | Light Vehicle |
|---|---|---|
| Total No. of Vehicle | 3 | 15 |
| Containers | | |
| Coaches | | |
| Lorries | 100% | |
| Taxi | | WK ~~100%~~ 90% |
| Van | | |
| Other | | 10% |

Heavy Vehicle : Containers, Coaches, and Lorries.

Light Vehicle : Private Car, Van, Taxi, Bike and Mini-bus.

Remark : The major noise sources from cooling tower, tank & ventilator

Conducted by WK Date 27-5-97

Checked by ______________ Date ______________

*without checking

 Updated on 29/05/97 - Issue 2

From: Mankie
Attn: Lawrence
97050/fmy70602.02 (Re-fax on 6/6)
Page 4 of 8

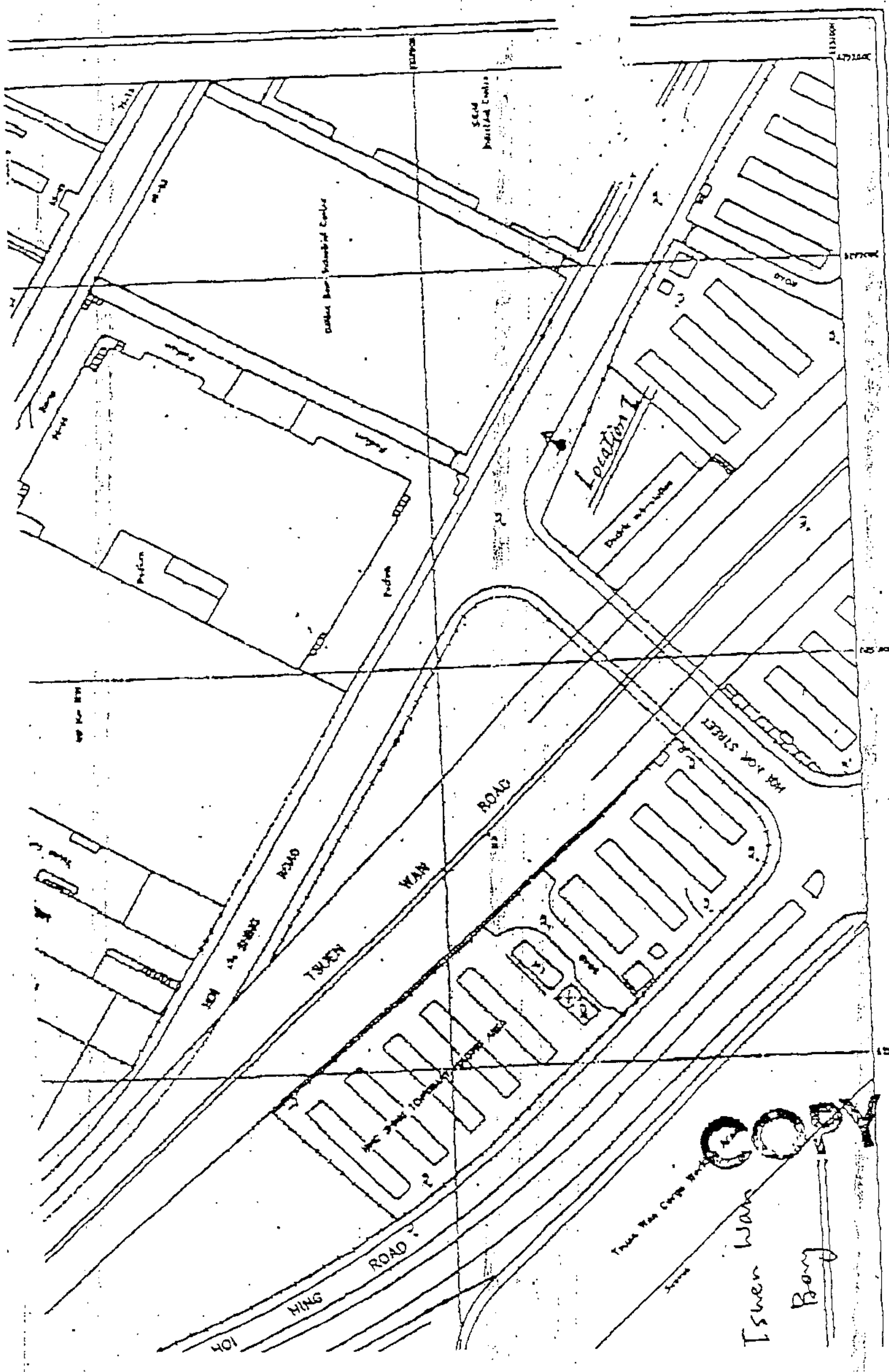



Figure 2: Monitoring Location (Eastern Source)

(5)

Re-fax on 6/6

| | |
|---|---|
| Job/Ref No. | 97050/fm70602.c? |
| From: | Mankie |
| Date Sent: | 2/6/97 |
| To: | CES |
| Attn: | Lawrence |
| Page 5 of 8 | |

CES (Asia) Ltd.
Tsuen Wan Bay Industrial
Noise Monitoring (Day-Time)

**Measurement**

| | | | | | |
|---|---|---|---|---|---|
| Type of B&K Sound Level Meter | | 2231 | Equipment No. | N-001-01A | |
| Location | | 1 (see drawing overleaf) | | | |
| Details of Location | | Sound level meter was placed 1.2m above ground at Hoi Shing Road. The mircophone facing the Golden Bear Industrial Center. | | | |
| Date of Measurement | | 28-5-97 | | | |
| Time of Measurement | From | 1020 | | 1600 | |
| | To | 1120 | | 1700 | |
| Measurement of Leq(30-min), dB(A) | 1 | 76.3 | | 75.6 | |
| | 2 | 75.9 | | 74.9 | |
| | Average | 76.1 | | 75.3 | |
| Wind Speed | | 0.2 ms⁻¹ | | 1.8 ms⁻¹ | |
| Measurement Time | | 1020 | | 1600 | |
| Equipment No. | | A-009-01 | | A-009-01 | |
| Calibration | | Before | After | Before | After |
| Type of Calibrator & equipment no | | 4230/N-003-01 | 4230/N-003-01 | 4230/N-003-01 | 4230/N-003-01 |
| Noise Level of Calibrator | | 93.85 | 93.85 | 93.85 | 93.85 |
| Frequency of Signal (KHz) | | 1 | 1 | 1 | 1 |
| Measurement (dB) | | 93.8 | 93.8 | 93.8 | 93.8 |
| No. of Vehicle cross the road during the measurement period | | Heavy Vehicle | Light Vehicle | Heavy Vehicle | Light Vehicle |
| Total No. of Vehicle | | 235 | 306 | 213 | 366 |
| Containers | | 25% | / | 25%. | / |
| Coaches | | 5% | | 5%. | |
| Lorries | | 70%. | | 70%. | |
| Taxi | | / | 10% | / | 25% |
| Van | | | 60%. | | 60%. |
| Other | | | 30% | | 15%. |

Heavy Vehicle : Containers , Coaches and Lorries.
Light Vehicle : Private Car, Van, Taxi, Bike and Mini-bus.

Conducted by WK      Date 28-5-97

Checked by ____________      Date ____________

Remark: major noise sources is traffic.

* without checking

Re-fax on 6/6

| | |
|---|---|
| Job/Ref No. | 97050Amy7b602.02 |
| From: | Maurice |
| Date Sent: | 2/6/97 |
| To: | CES |
| Attn: | Lawrence |
| Page 6 of 8 | |

CES (Asia) Ltd.

Tsuen Wan Bay Industrial
Noise Monitoring (Evening)

Measurement

| | | | | |
|---|---|---|---|---|
| Type of B&K Sound Level Meter | 2231 | Equipment No. | N-001-01A | |
| Location | | 1 (see drawing overleaf) | | |
| Details of Location | | Sound level meter was placed 1.2m above ground at Hoi Shing Road. The mircophone facing the Golden Bear Industrial Center. | | |
| Date of Measurement | | 28-5-97 | | |
| Time of Measurement | From | 2230 | | |
| | To | 2300 | | |
| Measurement of Leq(5 min), dB(A) | 1 | 71.5 | | |
| | 2 | 71.0 | | |
| | 3 | 70.0 | | |
| | 4 | 70.4 | | |
| | 5 | 71.1 | | |
| | 6 | 73.1 | | |
| | Average | 71.3 | | |
| ~~Leq(15 min), dB(A)~~ WK | | | | |

| Calibration | | Type of Calibrator & equipment no | Noise Level of Calibrator | Frequency of Signal (KHz) | Measurement (dB) |
|---|---|---|---|---|---|
| | Before | 4230/N003-01 | 93.85 dB | 1 | 93.8 |
| | After | 4230/N-003-01 | 93.85 dB | 1 | 93.8 |

Wind Speed : 0.2 m/s. Measurement Time : 2230 Equipment no : A-008-01

**No. of Vehicle cross the road during the measurement period**

| | Heavy Vehicle | Light Vehicle |
|---|---|---|
| Total No. of Vehicle | 9 | 25 |
| Containers | 40% | |
| Coaches | 10% | |
| Lorries | 50% | |
| Taxi | | 20% |
| Van | | 70% |
| Other | | 10% |

Heavy Vehicle : Containers, Coaches, and Lorries.

Light Vehicle : Private Car, Van, Taxi, Bike and Mini-bus.

Remark : The major noise sources from cooling tower tank & ventilator

Conducted by WK Date 28-5-97

Checked by ______ Date ______

* without checking

Re-fax on 6/6

| | |
|---|---|
| Job/Ref No. | P060/Amy70602.02 |
| From: | Man Kit |
| Date Sent: | 2/6/97 |
| To: | CES |
| Attn: | Lawrence |
| Page 7 of 8 | |

CES (Asia) Ltd.

Tsuen Wan Bay Industrial
Noise Monitoring (Night)

**Measurement**

| | | | | | |
|---|---|---|---|---|---|
| Type of B&K Sound Level Meter | | 2231 | Equipment No. | N-001-01A | |
| Location | | 1 (see drawing overleaf) | | | |
| Details of Location | | Sound level meter was placed 1.2m above ground at Hoi Shing Road. The mircophone facing the Golden Bear Industrial Center. | | | |
| Date of Measurement | | 18-5-97 | | | |
| Time of Measurement | From | 2300 | | | |
| | To | 2330 | | | |
| Measurement of Leq(5 min), dB(A) | 1 | 70.4 | | | |
| | 2 | 72.3 | | | |
| | 3 | 72.5 | | | |
| | 4 | 71.1 | | | |
| | 5 | 72.6 | | | |
| | 6 | 71.7 | | | |
| | Average | 71.8 | | | |
| Leq(15 min), dB(A) | | | | | |
| Calibration | | Type of Calibrator & equipment no | Noise Level of Calibrator | Frequency of Signal (KHz) | Measurement (dB) |
| | Before | 4230/N-003-01 | 93.85 dB | 1 | 93.8 |
| | After | 4230/N-003-01 | 93.85 dB | 1 | 93.8 |

Wind Speed : 0.1 m/s. Measurement Time : 23:00 Equipment no : A-003-01

**No. of Vehicle cross the road during the measurement period**

| | Heavy Vehicle | Light Vehicle |
|---|---|---|
| Total No. of Vehicle | 18 | 25 |
| Containers | 50% | |
| Coaches | 60% | |
| Lorries | 40% | |
| Taxi | | 40% |
| Van | | 40% |
| Other | | 20% |

Heavy Vehicle : Containers, Coaches, and Lorries.

Light Vehicle : Private Car, Van, Taxi, Bike and Mini-bus.

Remark : The major noise sources from cooling tower tank & ventilator.

Conducted by Lik Date 28-5-97

Checked by ____________ Date ____________

*without checking

Tsuen Wan Bay Further Reclamation Area 35
Environmental Impact Assessment
Industrial Noise Assessment

*DAYTIME (0700-1900)*

| | |
|---|---|
| Averaged noise level at location 1 (18m) | 76 dB(A) |
| Estimated Source Sound Power Level | 109 dB(A) |
| Acceptable Noise Level ANL | 70 dB(A) |

| Sensitive Receiver | Distance | Estimated Noise Level |
|---|---|---|
| 102A-6 | 170 | 60 |
| 104A-1 | 175 | 60 |

*EVENING (1900-2300)*

| | |
|---|---|
| Averaged noise level at location 1 (18m) | 71 dB(A) |
| Estimated Source Sound Power Level | 104 dB(A) |
| Acceptable Noise Level ANL | 70 dB(A) |

| Sensitive Receiver | Distance | Estimated Noise Level |
|---|---|---|
| 102A-6 | 170 | 54 |
| 104A-1 | 175 | 54 |

*NIGHTTIME (2300-0700)*

| | |
|---|---|
| Averaged noise level at location 1 (18m) | 71 dB(A) |
| Estimated Source Sound Power Level | 104 dB(A) |
| Acceptable Noise Level ANL | 60 dB(A) |

| Sensitive Receiver | Distance | Estimated Noise Level |
|---|---|---|
| 102A-6 | 170 | 55 |
| 104A-1 | 175 | 55 |

From: Mankie
Attn: Lawrence
97050/Fmy T0602.02 (Re-fax on 6/6)

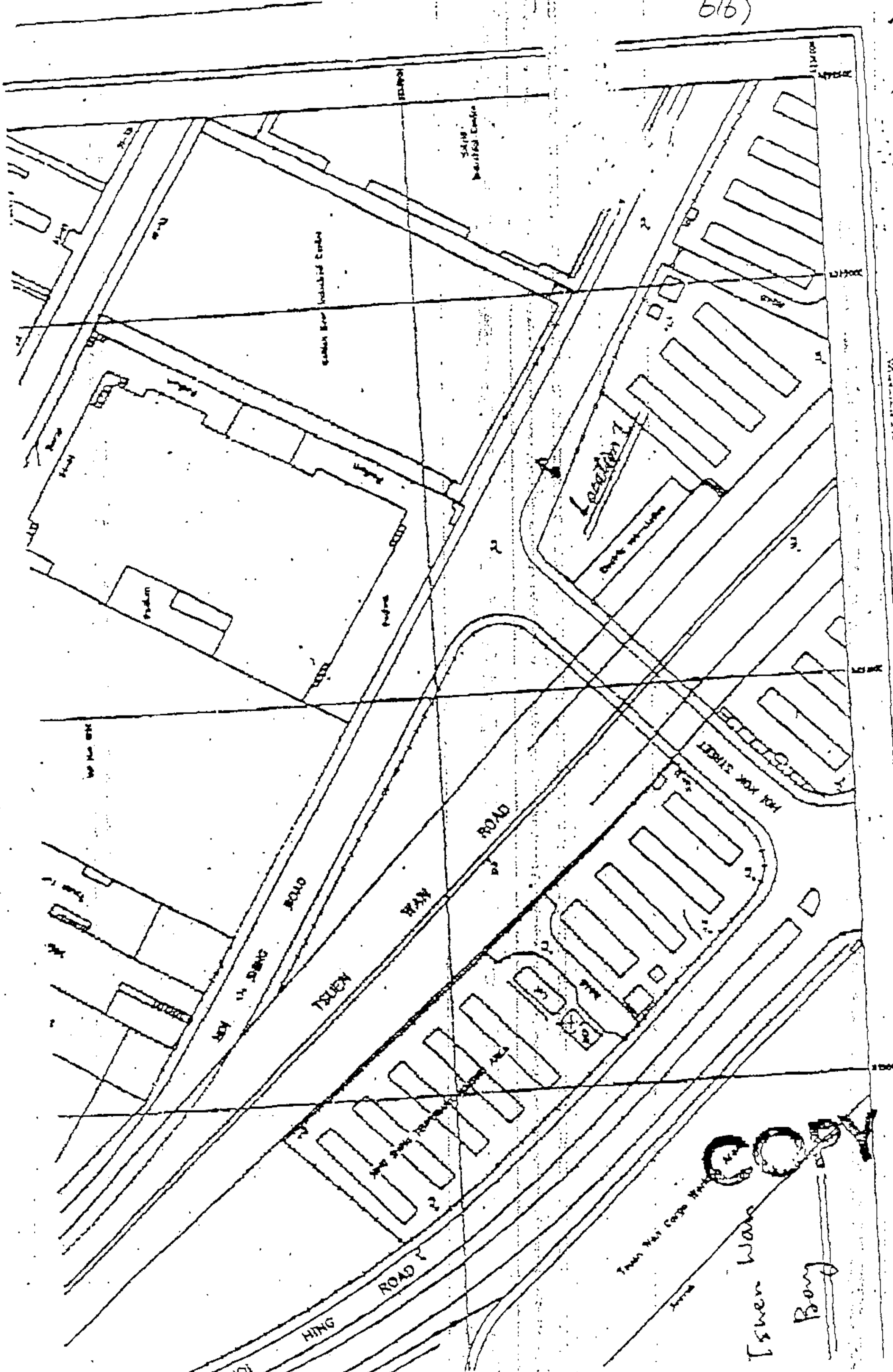



Figure 2: Monitoring Location (Eastern Source)

## APPENDIX B

## AIR QUALITY

This Appendix sets out the technical information for the air quality assessment of this report and is divided into four sections:

B1 Air Quality Assessment Methodology (Construction Phase)
B2 Air Quality Assessment Methodology (Operational Phase Traffic Emissions)
B3 Air Quality Assessment Methodology (Operational Phase Stack Emissions)
B4 Air Quality Assessment Results (Operational Phase)

## APPENDIX B1

## AIR QUALITY ASSESSMENT METHODOLOGY (CONSTRUCTION PHASE)

The following four attachments are attached to this Appendix B1:

(i) Table B1.1 Calculations of Dust Emission Factors

(ii) Figure B1.1 Schematic Diagram of the Modelled Construction Areas and Locations of Representiative ASRs

(iii) Table B1.2 Sample FDM Input File (No Dust Mitigation Scenario)

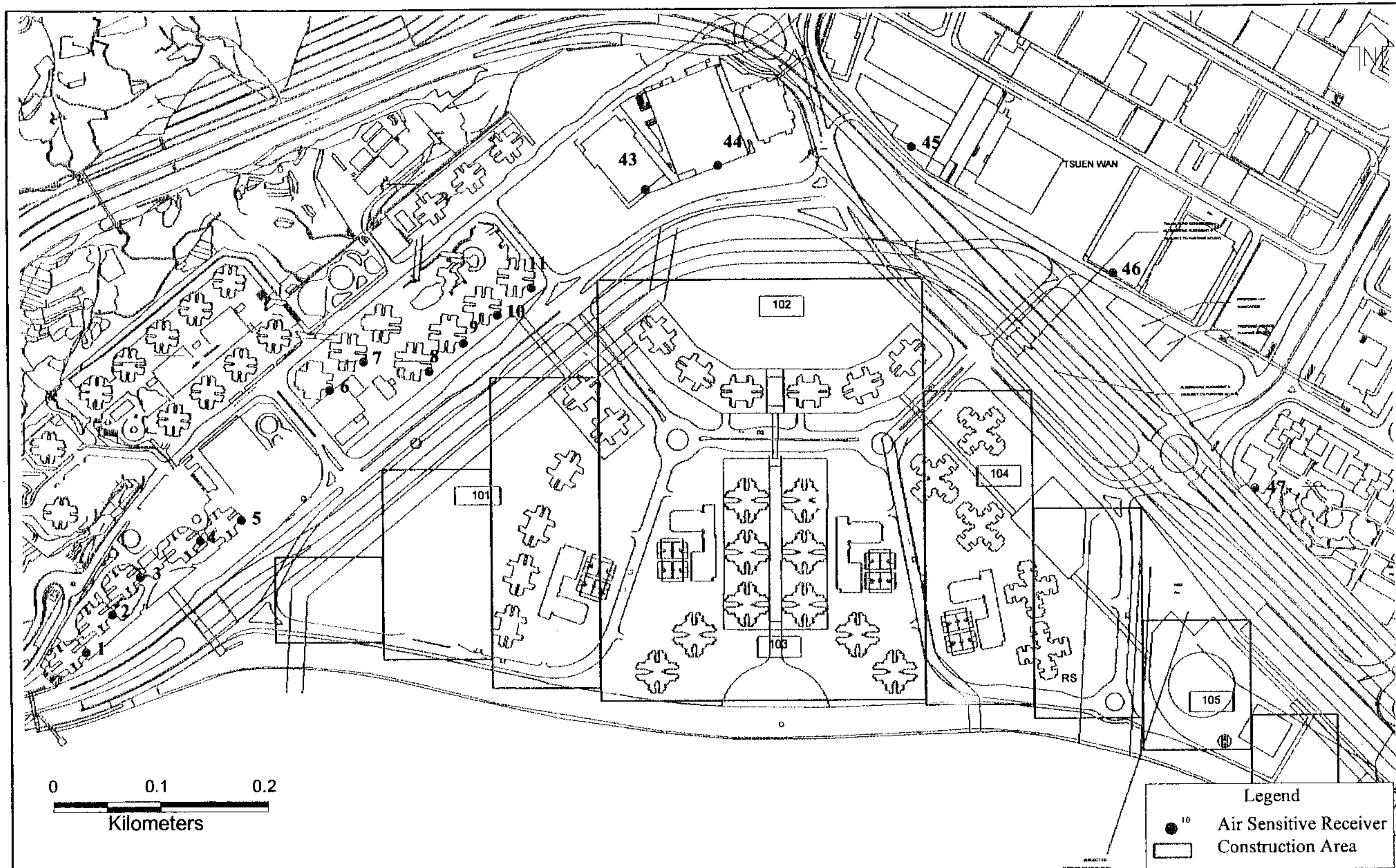
(iv) Table B1.3 Sample FDM Output File (No Dust Mitigation Scenario)

Table B1.1 Calculations of Dust Emission Factors

Estimated total construction area (sq.m) 235600

| Item | Description | | Remarks |
|---|---|---|---|
| 1 | General Construction Activities | | |
| | TSP emission factor (Mg/hectare/month) | 2.69 | *from AP-42 5th edition (S13.2.3.3)* |
| | Percentage area actively operating (%) | 30 | *estimated for typical construction site* |
| | Assuming no dust mitigation:- | | |
| | TSP emission factor (kg/day) | 634 | |
| | TSP emission factor (g/sq.m/sec) | 3.1134E-05 | |
| | Assuming 50% dust reduction:- | | *for twice daily watering with complete coverage (AP-42 4th edition S11.2.4.4)* |
| | TSP emission factor (kg/day) | 317 | *calculated* |
| | TSP emission factor (g/sq.m/sec) | 1.5567E-05 | *calculated* |
| | Assuming 75% dust reduction:- | | *for watering once every 1.5 hour with complete coverage* |
| | TSP emission factor (kg/day) | 158 | *calculated* |
| | TSP emission factor (g/sq.m/sec) | 7.7836E-06 | *calculated* |

| | | | |
|---|---|---|---|
| 2 | Site Erosion | | |
| | TSP emission factor (Mg/hectare/yr) | 0.85 | *from AP-42 5th edition (Table 11.9-4)* |
| | Percentage area actively operating (%) | 30 | *estimated for typical construction site* |
| | Assuming no dust mitigation:- | | |
| | TSP emission factor (kg/day) | 16 | |
| | TSP emission factor (g/sq.m/sec) | 8.0860E-07 | |
| | Assuming 50% dust reduction:- | | *for twice daily watering with complete coverage (AP-42 4th edition S11.2.4.4)* |
| | TSP emission factor (kg/day) | 8 | *calculated* |
| | TSP emission factor (g/sq.m/sec) | 4.0430E-07 | *calculated* |
| | Assuming 75% dust reduction:- | | *for watering once every 1.5 hour with complete coverage* |
| | TSP emission factor (kg/day) | 4 | *calculated* |
| | TSP emission factor (g/sq.m/sec) | 2.0215E-07 | *calculated* |




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

SCHEMATIC DIAGRAM OF THE MODELLED CONSTRUCTION AREA AND LOCATION OF THE REPRESENTATION ASRs

| | |
|---|---|
| FIGURE | B1.1 |
| SCALE | 1 : 5000 |

B010

# Table B1.2

## Sample FDM Input File (No Dust Mitigation Scenario)

```
Tsuen Wan Bay Further Reclamation Area 35 (Construction Activity)
 1 2 1 1 1 1 3 1 1 3 2 1 2 0
16   16    5    8760
60.       100.      1.        2.5       65.0
11111111111111111111111111111111111111111111111111111111111111111111111111111111
11111111111111111111111111111111111111111111111111111111111111111111111111111111
11111111111111111111111111111111111111111111111111111111111111111111111111111111
11111111111111111111111111111111111111111111111111111111111111111111111111111111
1111111111111111111111111111111111111111111110
1.25      3.75      7.5       12.5      22.5
0.0950    0.1050    0.1600    0.1400    0.5000
828223.00 825535.00 1.5
828248.00 825569.00 1.5
828275.00 825603.00 1.5
828331.00 825637.00 1.5
828370.00 825655.00 1.5
828452.00 825775.00 1.5
828484.00 825800.00 1.5
828544.00 825791.00 1.5
828576.00 825817.00 1.5
828607.00 825842.00 1.5
828639.00 825868.00 1.5
828745.00 825958.00 1.5
828812.00 825980.00 1.5
828991.00 825996.00 1.5
829176.00 825879.00 1.5
829305.00 825680.00 1.5
 3 3.1134E-05          828450.00 825581.75 100.0      78.5      0.0        0.0
 3 3.1134E-05          828550.00 825613.50 100.0     173.0      0.0        0.0
 3 3.1134E-05          828650.00 825642.50 100.0     285.0      0.0        0.0
 3 3.1134E-05          828850.00 825681.00 300.0     387.0      0.0        0.0
 3 3.1134E-05          829050.00 825626.50 100.0     288.0      0.0        0.0
 3 3.1134E-05          829150.00 825566.25 100.0     192.5      0.0        0.0
 3 3.1134E-05          829250.00 825500.00 100.0     120.0      0.0        0.0
 3 3.1134E-05          829340.00 825436.25  80.0      72.5      0.0        0.0
 3 8.0860E-07          828450.00 825581.75 100.0      78.5      0.0        0.0
 3 8.0860E-07          828550.00 825613.50 100.0     173.0      0.0        0.0
 3 8.0860E-07          828650.00 825642.50 100.0     285.0      0.0        0.0
 3 8.0860E-07          828850.00 825681.00 300.0     387.0      0.0        0.0
 3 8.0860E-07          829050.00 825626.50 100.0     288.0      0.0        0.0
 3 8.0860E-07          829150.00 825566.25 100.0     192.5      0.0        0.0
 3 8.0860E-07          829250.00 825500.00 100.0     120.0      0.0        0.0
 3 8.0860E-07          829340.00 825436.25  80.0      72.5      0.0        0.0
```

# Table B1.3

## Sample FDM Output file (No Dust Mitigation Scenario)

1

FUGITIVE DUST MODEL (FDM)
VERSION 95279
OCT, 1995
DATE AT START OF RUN: 10/21/97    TIME AT START OF RUN: 13:56:21.79

RUN TITLE:
Tsuen Wan Bay Further Reclamation Area 35 (Construction Activity)

INPUT FILE NAME: f:twbr_new.in
OUTPUT FILE NAME: f:twbr_new.out
MET DATA READ FROM FILE NAME: f:cph94.met
HOURLY EMISSIONS READ FROM FILE NAME: f:twbr.hry

| | |
|---|---|
| CONVERGENCE OPTION 1=OFF, 2=ON | 1 |
| MET OPTION SWITCH, 1=CARDS, 2=PREPROCESSED | 2 |
| PLOT FILE OUTPUT, 1=NO, 2=YES | 1 |
| MET DATA PRINT SWITCH, 1=NO, 2=YES | 1 |
| POST-PROCESSOR OUTPUT, 1=NO, 2=YES | 1 |
| DEP. VEL./GRAV. SETL. VEL., 1=DEFAULT, 2=USER | 1 |
| PRINT 1-HOUR AVERAGE CONCEN, 1=NO, 2=YES | 3 |
| PRINT 3-HOUR AVERAGE CONCEN, 1=NO, 2=YES | 1 |
| PRINT 8-HOUR AVERAGE CONCEN, 1=NO, 2=YES | 1 |
| PRINT 24-HOUR AVERAGE CONCEN, 1=NO, 2=YES | 3 |
| PRINT LONG-TERM AVERAGE CONCEN, 1=NO, 2=YES | 2 |
| BYPASS RAMMET CALMS RECOGNITION, 1=NO, 2=YES | 1 |
| READ HOURLY EMISSION RATES, 1=NO, 2=YES | 2 |
| NUMBER OF SOURCES PROCESSED | 16 |
| NUMBER OF RECEPTORS PROCESSED | 16 |
| NUMBER OF PARTICLE SIZE CLASSES | 5 |
| NUMBER OF HOURS OF MET DATA PROCESSED | 8760 |
| LENGTH IN MINUTES OF 1-HOUR OF MET DATA | 60. |
| ROUGHNESS LENGTH IN CM | 100.00 |
| SCALING FACTOR FOR SOURCE AND RECPTORS | 1.0000 |
| PARTICLE DENSITY IN G/CM**3 | 2.50 |
| ANEMOMETER HEIGHT IN M | 65.00 |

PREPROCESSED METEOROLOGICAL DATA SELECTION SWITCHES
11111111111111111111111111111111111111111111111111111111111111111111111111111111
11111111111111111111111111111111111111111111111111111111111111111111111111111111
11111111111111111111111111111111111111111111111111111111111111111111111111111111
11111111111111111111111111111111111111111111111111111111111111111111111111111111
111111111111111111111111111111111111111111110

GENERAL PARTICLE SIZE CLASS INFORMATION

| PARTICLE SIZE CLASS | CHAR. DIA. (UM) | GRAV. SETTLING VELOCITY (M/SEC) | DEPOSITION VELOCITY (M/SEC) | FRACTION IN EACH SIZE CLASS |
|---|---|---|---|---|
| 1 | 1.2500000 | ** | ** | 0.0950 |
| 2 | 3.7500000 | ** | ** | 0.1050 |
| 3 | 7.5000000 | ** | ** | 0.1600 |
| 4 | 12.5000000 | ** | ** | 0.1400 |
| 5 | 22.5000000 | ** | ** | 0.5000 |

** COMPUTED BY FDM

1

RECEPTOR COORDINATES (X,Y,Z)

(828223., 825535., 2.) (828248., 825569., 2.) (828275., 825603., 2.)
(828331., 825637., 2.) (828370., 825655., 2.) (828452., 825775., 2.)
(828484., 825800., 2.) (828544., 825791., 2.) (828576., 825817., 2.)
(828607., 825842., 2.) (828639., 825868., 2.) (828745., 825958., 2.)
(828812., 825980., 2.) (828991., 825996., 2.) (829176., 825879., 2.)
(829305., 825680., 2.) (

1

SOURCE INFORMATION

| TYPE | ENTERED EMIS. RATE (G/SEC, G/SEC/M OR G/SEC/M**2) | TOTAL EMISSION RATE (G/SEC) | WIND SPEED FAC. | X1 (M) | Y1 (M) | X2 (M) | Y2 (M) | HEIGHT (M) | WIDTH (M) |
|---|---|---|---|---|---|---|---|---|---|
| 3 | -1.000000000 | -1.00000 | 0.000 | 828450. | 825582. | 100. | 79. | 0.50 | 0.00 |
| 3 | -1.000000000 | -1.00000 | 0.000 | 828550. | 825614. | 100. | 173. | 0.50 | 0.00 |
| 3 | -1.000000000 | -1.00000 | 0.000 | 828650. | 825643. | 100. | 285. | 0.50 | 0.00 |
| 3 | -1.000000000 | -1.00000 | 0.000 | 828850. | 825681. | 300. | 387. | 0.50 | 0.00 |
| 3 | -1.000000000 | -1.00000 | 0.000 | 829050. | 825627. | 100. | 288. | 0.50 | 0.00 |
| 3 | -1.000000000 | -1.00000 | 0.000 | 829150. | 825566. | 100. | 193. | 0.50 | 0.00 |
| 3 | -1.000000000 | -1.00000 | 0.000 | 829250. | 825500. | 100. | 120. | 0.50 | 0.00 |
| 3 | -1.000000000 | -1.00000 | 0.000 | 829340. | 825436. | 80. | 73. | 0.50 | 0.00 |
| 3 | -1.000000000 | -1.00000 | 0.000 | 828450. | 825582. | 100. | 79. | 0.50 | 0.00 |

# Table B1.3
## Sample FDM Output file (No Dust Mitigation Scenario)

```
3    -1.000000000    -1.00000  0.000 828550.  825614.    100.     173.    0.50    0.00
3    -1.000000000    -1.00000  0.000 828650.  825643.    100.     285.    0.50    0.00
3    -1.000000000    -1.00000  0.000 828850.  825681.    300.     387.    0.50    0.00
3    -1.000000000    -1.00000  0.000 829050.  825627.    100.     288.    0.50    0.00
3    -1.000000000    -1.00000  0.000 829150.  825566.    100.     193.    0.50    0.00
3    -1.000000000    -1.00000  0.000 829250.  825500.    100.     120.    0.50    0.00
3    -1.000000000    -1.00000  0.000 829340.  825436.     80.      73.    0.50    0.00

     SHORT DISTANCE (5,000 M) MASS CONSERVATION CORRECTION FACTORS USED

1
         8760 HOUR AVERAGE FOR HOUR ENDING  8760
                  CONCENTRATIONS IN MICROGRAMS/M**3
                  AVERAGE EMISSIONS FOR THIS PERIOD =     0.31824E+01 GRAMS/SEC
 (828223., 825535.,      5.355)  (828248., 825569.,      6.490)  (828275., 825603.,      8.471)
 (828331., 825637.,     16.386)  (828370., 825655.,     28.206)  (828452., 825775.,     24.832)
 (828484., 825800.,     25.791)  (828544., 825791.,     35.052)  (828576., 825817.,     38.629)
 (828607., 825842.,     39.071)  (828639., 825868.,     38.460)  (828745., 825958.,     32.605)
 (828812., 825980.,     27.561)  (828991., 825996.,     15.109)  (829176., 825879.,      9.264)
 (829305., 825680.,      9.715)  (
1
         8760 HOUR AVERAGE FOR HOUR ENDING  8760
                  DEPOSITION RATE IN MICROGRAMS/M**2/SEC

 (828223., 825535.,**********)  (828248., 825569.,**********)  (828275., 825603.,**********)
 (828331., 825637.,**********)  (828370., 825655.,**********)  (828452., 825775.,**********)
 (828484., 825800.,**********)  (828544., 825791.,**********)  (828576., 825817.,**********)
 (828607., 825842.,**********)  (828639., 825868.,**********)  (828745., 825958.,**********)
 (828812., 825980.,**********)  (828991., 825996.,**********)  (829176., 825879.,**********)
 (829305., 825680.,**********)  (
****** NOTE: FOR RECEPTORS WITH Z UNEQUAL 0, DEPOSITION IS SET TO 999999.999
1
```

TOP 50 TABLE FOR 1 HOUR AVERAGES

| RANK | RECEPTOR | X-COORDINATE | Y-COORDINATE | ENDING HOUR | CONCENTRATION | DEPOSITION |
|---|---|---|---|---|---|---|
| 1 | 4 | 828331.0 | 825637.0 | 8531 | 803.8433 | 6.6816 |
| 2 | 8 | 828544.0 | 825791.0 | 8531 | 763.5375 | 6.3415 |
| 3 | 8 | 828544.0 | 825791.0 | 3201 | 752.9759 | 6.6159 |
| 4 | 4 | 828331.0 | 825637.0 | 203 | 744.3578 | 6.7967 |
| 5 | 4 | 828331.0 | 825637.0 | 1380 | 743.0231 | 5.4656 |
| 6 | 8 | 828544.0 | 825791.0 | 203 | 737.9810 | 6.1688 |
| 7 | 8 | 828544.0 | 825791.0 | 8530 | 721.3578 | 6.1362 |
| 8 | 9 | 828576.0 | 825817.0 | 8651 | 719.3557 | 6.6447 |
| 9 | 9 | 828576.0 | 825817.0 | 8604 | 718.4465 | 6.6867 |
| 10 | 9 | 828576.0 | 825817.0 | 2264 | 714.5004 | 6.6851 |
| 11 | 11 | 828639.0 | 825868.0 | 2264 | 714.3026 | 6.1748 |
| 12 | 11 | 828639.0 | 825868.0 | 1475 | 707.3624 | 6.0072 |
| 13 | 11 | 828639.0 | 825868.0 | 3201 | 701.5390 | 6.1950 |
| 14 | 11 | 828639.0 | 825868.0 | 8651 | 700.3471 | 5.9328 |
| 15 | 11 | 828639.0 | 825868.0 | 8530 | 694.5079 | 5.8799 |
| 16 | 9 | 828576.0 | 825817.0 | 2242 | 685.1829 | 6.6733 |
| 17 | 3 | 828275.0 | 825603.0 | 1380 | 678.2628 | 4.7473 |
| 18 | 9 | 828576.0 | 825817.0 | 1475 | 669.2492 | 6.1029 |
| 19 | 8 | 828544.0 | 825791.0 | 1380 | 667.8696 | 5.3442 |
| 20 | 5 | 828370.0 | 825655.0 | 2264 | 667.6415 | 7.4752 |
| 21 | 9 | 828576.0 | 825817.0 | 203 | 667.6110 | 5.2158 |
| 22 | 5 | 828370.0 | 825655.0 | 8651 | 665.1761 | 7.4110 |
| 23 | 10 | 828607.0 | 825842.0 | 3201 | 662.0514 | 5.4471 |
| 24 | 4 | 828331.0 | 825637.0 | 3201 | 661.3727 | 6.5020 |
| 25 | 11 | 828639.0 | 825868.0 | 203 | 655.2022 | 5.5816 |
| 26 | 5 | 828370.0 | 825655.0 | 8604 | 653.7908 | 7.4269 |
| 27 | 9 | 828576.0 | 825817.0 | 6272 | 650.5750 | 6.4272 |
| 28 | 4 | 828331.0 | 825637.0 | 7810 | 647.7831 | 11.9561 |
| 29 | 9 | 828576.0 | 825817.0 | 3465 | 646.8087 | 6.6263 |
| 30 | 10 | 828607.0 | 825842.0 | 8530 | 643.3088 | 5.0527 |
| 31 | 9 | 828576.0 | 825817.0 | 3201 | 643.2978 | 5.2572 |
| 32 | 2 | 828248.0 | 825569.0 | 7424 | 638.0986 | 4.5245 |
| 33 | 9 | 828576.0 | 825817.0 | 780 | 637.5142 | 6.1224 |
| 34 | 11 | 828639.0 | 825868.0 | 8604 | 629.5737 | 5.2207 |
| 35 | 5 | 828370.0 | 825655.0 | 1475 | 627.9432 | 6.8189 |
| 36 | 12 | 828745.0 | 825958.0 | 608 | 627.9111 | 5.1298 |
| 37 | 12 | 828745.0 | 825958.0 | 8410 | 625.8242 | 5.2476 |
| 38 | 12 | 828745.0 | 825958.0 | 2240 | 624.8545 | 5.3159 |
| 39 | 12 | 828745.0 | 825958.0 | 5504 | 623.3417 | 5.4230 |
| 40 | 9 | 828576.0 | 825817.0 | 5264 | 622.8802 | 6.1822 |
| 41 | 12 | 828745.0 | 825958.0 | 204 | 621.6693 | 5.2322 |
| 42 | 10 | 828607.0 | 825842.0 | 203 | 620.7296 | 4.8706 |
| 43 | 12 | 828745.0 | 825958.0 | 129 | 618.1753 | 5.1594 |
| 44 | 12 | 828745.0 | 825958.0 | 7425 | 617.2183 | 5.2269 |
| 45 | 5 | 828370.0 | 825655.0 | 2242 | 614.7042 | 7.2763 |
| 46 | 12 | 828745.0 | 825958.0 | 56 | 613.4222 | 5.0740 |
| 47 | 9 | 828576.0 | 825817.0 | 392 | 610.4191 | 5.8842 |
| 48 | 8 | 828544.0 | 825791.0 | 1475 | 608.5301 | 5.2788 |
| 49 | 9 | 828576.0 | 825817.0 | 6561 | 607.0339 | 6.2342 |
| 50 | 12 | 828745.0 | 825958.0 | 7259 | 606.5768 | 5.1365 |

# Table B1.3
## Sample FDM Output file (No Dust Mitigation Scenario)

1

HIGHEST AND SECOND HIGHEST VALUES FOR 1 HOUR AVERAGES

| RECEPTOR | X-COORDINATE | Y-COORDINATE | HIGHEST VALUE | ENDING HOUR | DEPOSITION | SECOND HIGH | ENDING HOUR | DEPOSTION |
|---|---|---|---|---|---|---|---|---|
| 1 | 828223.0 | 825535.0 | 597.5963 | 1232. | 3.8212 | 580.1410 | 7424. | 3.9388 |
| 2 | 828248.0 | 825569.0 | 638.0986 | 7424. | 4.5245 | 523.6837 | 1232. | 3.3803 |
| 3 | 828275.0 | 825603.0 | 678.2628 | 1380. | 4.7473 | 540.7587 | 7424. | 3.8482 |
| 4 | 828331.0 | 825637.0 | 803.8433 | 8531. | 6.6816 | 744.3578 | 203. | 6.7967 |
| 5 | 828370.0 | 825655.0 | 667.6415 | 2264. | 7.4752 | 665.1761 | 8651. | 7.4110 |
| 6 | 828452.0 | 825775.0 | 534.5756 | 1380. | 3.4753 | 525.7858 | 8531. | 3.4752 |
| 7 | 828484.0 | 825800.0 | 579.4915 | 8531. | 4.0329 | 571.0229 | 203. | 4.0152 |
| 8 | 828544.0 | 825791.0 | 763.5375 | 8531. | 6.3415 | 752.9759 | 3201. | 6.6159 |
| 9 | 828576.0 | 825817.0 | 719.3557 | 8651. | 6.6447 | 718.4465 | 8604. | 6.6867 |
| 10 | 828607.0 | 825842.0 | 662.0514 | 3201. | 5.4471 | 643.3088 | 8530. | 5.0527 |
| 11 | 828639.0 | 825868.0 | 714.3026 | 2264. | 6.1748 | 707.3624 | 1475. | 6.0072 |
| 12 | 828745.0 | 825958.0 | 627.9111 | 608. | 5.1298 | 625.8242 | 8410. | 5.2476 |
| 13 | 828812.0 | 825980.0 | 577.6899 | 3034. | 4.7788 | 577.6899 | 5433. | 4.7788 |
| 14 | 828991.0 | 825996.0 | 495.6718 | 7331. | 3.7400 | 495.1936 | 609. | 3.5604 |
| 15 | 829176.0 | 825879.0 | 470.0587 | 5505. | 3.2431 | 464.7409 | 201. | 3.0456 |
| 16 | 829305.0 | 825680.0 | 567.2269 | 2939. | 3.9310 | 553.0450 | 1138. | 3.6895 |

1

TOP 50 TABLE FOR 24 HOUR AVERAGES

| RANK | RECEPTOR | X-COORDINATE | Y-COORDINATE | ENDING HOUR | CONCENTRATION | DEPOSITION |
|---|---|---|---|---|---|---|
| 1 | 9 | 828576.0 | 825817.0 | 864 | 131.1968 | 2.4962 |
| 2 | 10 | 828607.0 | 825842.0 | 864 | 130.3373 | 2.4154 |
| 3 | 11 | 828639.0 | 825868.0 | 864 | 125.2813 | 2.2746 |
| 4 | 12 | 828745.0 | 825958.0 | 2256C | 122.8081 | 2.0560 |
| 5 | 12 | 828745.0 | 825958.0 | 624 | 121.9034 | 1.1173 |
| 6 | 12 | 828745.0 | 825958.0 | 5640C | 119.5860 | 1.8884 |
| 7 | 12 | 828745.0 | 825958.0 | 864 | 116.5698 | 2.0391 |
| 8 | 10 | 828607.0 | 825842.0 | 216 | 114.9621 | 1.6600 |
| 9 | 13 | 828812.0 | 825980.0 | 5640C | 114.3083 | 1.9062 |
| 10 | 10 | 828607.0 | 825842.0 | 624 | 111.7619 | 1.1095 |
| 11 | 12 | 828745.0 | 825958.0 | 936 | 109.9186 | 1.1382 |
| 12 | 13 | 828812.0 | 825980.0 | 2256C | 109.6489 | 1.8735 |
| 13 | 13 | 828812.0 | 825980.0 | 624 | 109.3444 | 0.9471 |
| 14 | 10 | 828607.0 | 825842.0 | 2256C | 107.4849 | 1.7966 |
| 15 | 13 | 828812.0 | 825980.0 | 936 | 106.4605 | 1.0643 |
| 16 | 11 | 828639.0 | 825868.0 | 216 | 106.3965 | 1.4723 |
| 17 | 10 | 828607.0 | 825842.0 | 5640C | 104.8600 | 1.7212 |
| 18 | 8 | 828544.0 | 825791.0 | 864 | 104.5812 | 1.9385 |
| 19 | 9 | 828576.0 | 825817.0 | 1080 | 104.4967 | 2.4149 |
| 20 | 9 | 828576.0 | 825817.0 | 120C | 101.9001 | 2.6069 |
| 21 | 13 | 828812.0 | 825980.0 | 3072 | 101.6402 | 1.4830 |
| 22 | 12 | 828745.0 | 825958.0 | 2280 | 101.3132 | 1.6164 |
| 23 | 9 | 828576.0 | 825817.0 | 6288 | 100.5330 | 2.4218 |
| 24 | 11 | 828639.0 | 825868.0 | 2280 | 100.0751 | 1.5344 |
| 25 | 9 | 828576.0 | 825817.0 | 2256C | 99.9584 | 1.5928 |
| 26 | 12 | 828745.0 | 825958.0 | 2328 | 99.0184 | 1.7837 |
| 27 | 11 | 828639.0 | 825868.0 | 2256C | 98.9496 | 1.6947 |
| 28 | 9 | 828576.0 | 825817.0 | 216 | 98.8107 | 1.4547 |
| 29 | 9 | 828576.0 | 825817.0 | 624 | 98.6774 | 0.9754 |
| 30 | 11 | 828639.0 | 825868.0 | 5640C | 98.4273 | 1.6002 |
| 31 | 13 | 828812.0 | 825980.0 | 6240 | 97.5783 | 1.2566 |
| 32 | 12 | 828745.0 | 825958.0 | 3072 | 97.5765 | 1.5011 |
| 33 | 10 | 828607.0 | 825842.0 | 1080 | 97.2890 | 2.2449 |
| 34 | 11 | 828639.0 | 825868.0 | 240 | 96.9746 | 2.2306 |
| 35 | 11 | 828639.0 | 825868.0 | 7536 | 96.5125 | 1.5330 |
| 36 | 11 | 828639.0 | 825868.0 | 624 | 96.4368 | 0.8927 |
| 37 | 12 | 828745.0 | 825958.0 | 6240 | 95.9961 | 1.2341 |
| 38 | 9 | 828576.0 | 825817.0 | 240 | 95.5140 | 2.1696 |
| 39 | 12 | 828745.0 | 825958.0 | 5520C | 95.5006 | 1.4740 |
| 40 | 12 | 828745.0 | 825958.0 | 192 | 94.5347 | 1.2716 |
| 41 | 10 | 828607.0 | 825842.0 | 7536 | 94.1574 | 1.5482 |
| 42 | 12 | 828745.0 | 825958.0 | 216 | 94.0635 | 1.3550 |
| 43 | 13 | 828812.0 | 825980.0 | 2328 | 93.8260 | 1.7074 |
| 44 | 12 | 828745.0 | 825958.0 | 1080 | 93.7119 | 2.0735 |
| 45 | 10 | 828607.0 | 825842.0 | 120C | 93.3674 | 2.3931 |
| 46 | 5 | 828370.0 | 825655.0 | 864 | 92.3264 | 1.9263 |
| 47 | 10 | 828607.0 | 825842.0 | 5520C | 91.8369 | 1.5247 |
| 48 | 9 | 828576.0 | 825817.0 | 696 | 91.5764 | 2.4546 |
| 49 | 10 | 828607.0 | 825842.0 | 6288 | 91.4517 | 2.1629 |
| 50 | 10 | 828607.0 | 825842.0 | 24 | 91.2079 | 1.5709 |

1

HIGHEST AND SECOND HIGHEST VALUES FOR 24 HOUR AVERAGES

\b010\model\fdm\twbr_new.out

## Table B1.3

Sample FDM Output file (No Dust Mitigation Scenario)

| RECEPTOR | X-COORDINATE | Y-COORDINATE | HIGHEST VALUE | ENDING HOUR | DEPOSITION | SECOND HIGH | ENDING HOUR | DEPOSTION |
|---|---|---|---|---|---|---|---|---|
| 1 | 828223.0 | 825535.0 | 40.4367 | 2496. | 0.8430 | 38.1871 | 8184. | 1.4872 |
| 2 | 828248.0 | 825569.0 | 45.6323 | 2496. | 0.9646 | 41.8640 | 8184. | 1.6399 |
| 3 | 828275.0 | 825603.0 | 47.9250 | 7872. | 0.6016 | 45.8440 | 2496. | 1.0091 |
| 4 | 828331.0 | 825637.0 | 68.5021 | 264. | 2.6331 | 62.1949 | 8040. | 2.2234 |
| 5 | 828370.0 | 825655.0 | 92.3264 | 864. | 1.9263 | 80.8716 | 120.C | 2.1722 |
| 6 | 828452.0 | 825775.0 | 77.0410 | 864. | 1.3931 | 65.2026 | 216. | 0.8698 |
| 7 | 828484.0 | 825800.0 | 83.8658 | 864. | 1.4757 | 72.0487 | 216. | 0.9435 |
| 8 | 828544.0 | 825791.0 | 104.5812 | 864. | 1.9385 | 90.2887 | 216. | 1.2624 |
| 9 | 828576.0 | 825817.0 | 131.1968 | 864. | 2.4962 | 104.4967 | 1080. | 2.4149 |
| 10 | 828607.0 | 825842.0 | 130.3373 | 864. | 2.4154 | 114.9621 | 216. | 1.6600 |
| 11 | 828639.0 | 825868.0 | 125.2813 | 864. | 2.2746 | 106.3965 | 216. | 1.4723 |
| 12 | 828745.0 | 825958.0 | 122.8081 | 2256.C | 2.0560 | 121.9034 | 624. | 1.1173 |
| 13 | 828812.0 | 825980.0 | 114.3083 | 5640.C | 1.8062 | 109.6489 | 2256.C | 1.8735 |
| 14 | 828991.0 | 825996.0 | 85.0664 | 936. | 0.7999 | 75.7709 | 7920. | 0.9105 |
| 15 | 829176.0 | 825879.0 | 60.3597 | 4392. | 0.6450 | 58.3161 | 5280. | 0.7815 |
| 16 | 829305.0 | 825680.0 | 76.1047 | 4392. | 0.7524 | 63.4968 | 6072.C | 0.6962 |

DATE AT END OF RUN: 10/21/97 TIME AT END OF RUN: 14:06:57.39
ELAPSED TIME FOR THIS RUN: 0.63560E+03 SECONDS
OR 0 HOURS 10 MINUTES 35.60 SECONDS

## APPENDIX B2

## AIR QUALITY ASSESSMENT METHODOLOGY (OPERATIONAL PHASE TRAFFIC EMISSIONS)

The following nine attachments are attached to this Appendix B2:

(i) Table B2.1 Composite Vehicle Emission Factors

(ii) Table B2.2 Detailed Calculations of Tunnel Portal Emission Rates

(iii) Figure B2.1 Proposed Location of the Ventilation Shaft

(iv) Figure B2.2 The Location Plan of the Representative ASRs and the Modelled Road Links

(v) Table B2.3 Sample CALINE4 Input File

(vi) Table B2.4 Sample CALINE4 Output File

(vii) Table B2.5 Sample ISCST Input File (Tunnel Portals Emissions)

(viii) Table B2.6 Sample ISCST Output File (Tunnel Portals Emissions)

(ix) Table B2.7 Sample ISCST Input File (Ventilation Shaft Emission)

(x) Table B2.8 Sample ISCST Output File (Ventilation Shaft Emission)

(xi) Table B2.9 Sample ISCST Input File (100% Tunnel Traffic Emission through Ventilation Shaft)

(xii) Table B2.10 Sample ISCST Output File (100% Tunnel Traffic Emission through Ventilation Shaft)

Table B2.1 Composite Vehicle Emission Factors

| Road | Direction | Percentage of Vehicle | | | Emission Factor (g km$^{-1}$ vehicle$^{-1}$) | | |
|---|---|---|---|---|---|---|---|
| | | Private Car | Public Bus | Goods Vehicle * | RSP | NOx | CO |
| Hoi On Road | EB | 82.7 | 6.2 | 11.1 | 0.145 | 2.232 | 12.419 |
| | WB | 78.8 | 11.2 | 10.1 | 0.183 | 2.550 | 12.273 |
| Hoi On Road | EB | 83.8 | 5.6 | 10.6 | 0.138 | 2.171 | 12.481 |
| | WB | 73.3 | 12.0 | 14.6 | 0.211 | 2.803 | 11.902 |
| Hoi On Road | WB | 79.9 | 6.3 | 13.8 | 0.158 | 2.350 | 12.222 |
| | WB | 70.3 | 13.2 | 16.4 | 0.230 | 2.965 | 11.717 |
| Hoi Hing Road | NB | 79.1 | 7.3 | 13.6 | 0.166 | 2.416 | 12.188 |
| | SB | 69.4 | 8.1 | 22.4 | 0.214 | 2.845 | 11.509 |
| Tsuen Wan Road | NB | 16.5 | 16.9 | 66.6 | 0.494 | 5.318 | 7.898 |
| | SB | 70.4 | 6.9 | 22.7 | 0.205 | 2.767 | 11.544 |
| Tsuen Wan Road, Hoi Hing Road, | NB | 48.9 | 12.2 | 38.9 | 0.325 | 3.823 | 10.128 |
| On/Off Ramps | SB | 76.9 | 5.6 | 17.5 | 0.170 | 2.454 | 11.981 |
| Tsuen Wan Road, | NB | 44.8 | 6.7 | 48.5 | 0.323 | 3.823 | 9.677 |
| On/Off Ramps | SB | 81.1 | 2.4 | 16.4 | 0.138 | 2.181 | 12.202 |
| Road D1 | NB | 81.7 | 12.4 | 6.0 | 0.174 | 2.468 | 12.517 |
| | SB | 97.2 | 0.0 | 2.8 | 0.054 | 1.438 | 13.303 |
| Road D3 | EB | 92.5 | 3.2 | 4.3 | 0.088 | 1.731 | 13.050 |
| | WB | 86.3 | 8.4 | 5.3 | 0.138 | 2.154 | 12.742 |
| Road D2 | EB | 93.3 | 0.0 | 6.7 | 0.072 | 1.601 | 13.018 |
| | WB | 85.4 | 0.0 | 14.6 | 0.109 | 1.931 | 12.441 |
| Road L1 | NB | 83.4 | 7.0 | 9.6 | 0.145 | 2.230 | 12.493 |
| | SB | 91.9 | 0.0 | 8.1 | 0.078 | 1.657 | 12.921 |
| Road L2 | NB | 89.6 | 5.0 | 5.4 | 0.108 | 1.906 | 12.893 |
| | SB | 88.8 | 6.6 | 4.6 | 0.119 | 1.993 | 12.873 |
| Road L2 | EB | 90.1 | 8.4 | 1.5 | 0.119 | 1.992 | 13.020 |
| | WB | 88.2 | 8.4 | 3.4 | 0.129 | 2.074 | 12.881 |
| Road L3 | NB | 87.5 | 8.3 | 4.2 | 0.131 | 2.096 | 12.833 |
| | SB | 89.2 | 5.6 | 5.2 | 0.113 | 1.942 | 12.879 |
| Tunnel Bypass Exit Portal | EB | 87.9 | 0.0 | 12.1 | 0.097 | 1.824 | 12.628 |
| Tunnel Bypass - Tsuen Wan Road | EB | 87.1 | 1.1 | 11.8 | 0.105 | 1.891 | 12.602 |
| On-Ramp | | | | | | | |
| Tsuen Wan Road - Tunnel Bypass | WB | 55.9 | 0.0 | 44.1 | 0.246 | 3.159 | 10.292 |
| Off-Ramp | | | | | | | |

* It is assumed the precentage of HGVs and LGVs is 70% and 30% of the goods vehicles (GVs) respectively.

Table B2.2 Detailed Calculations of Tunnel Portal Emission Rates

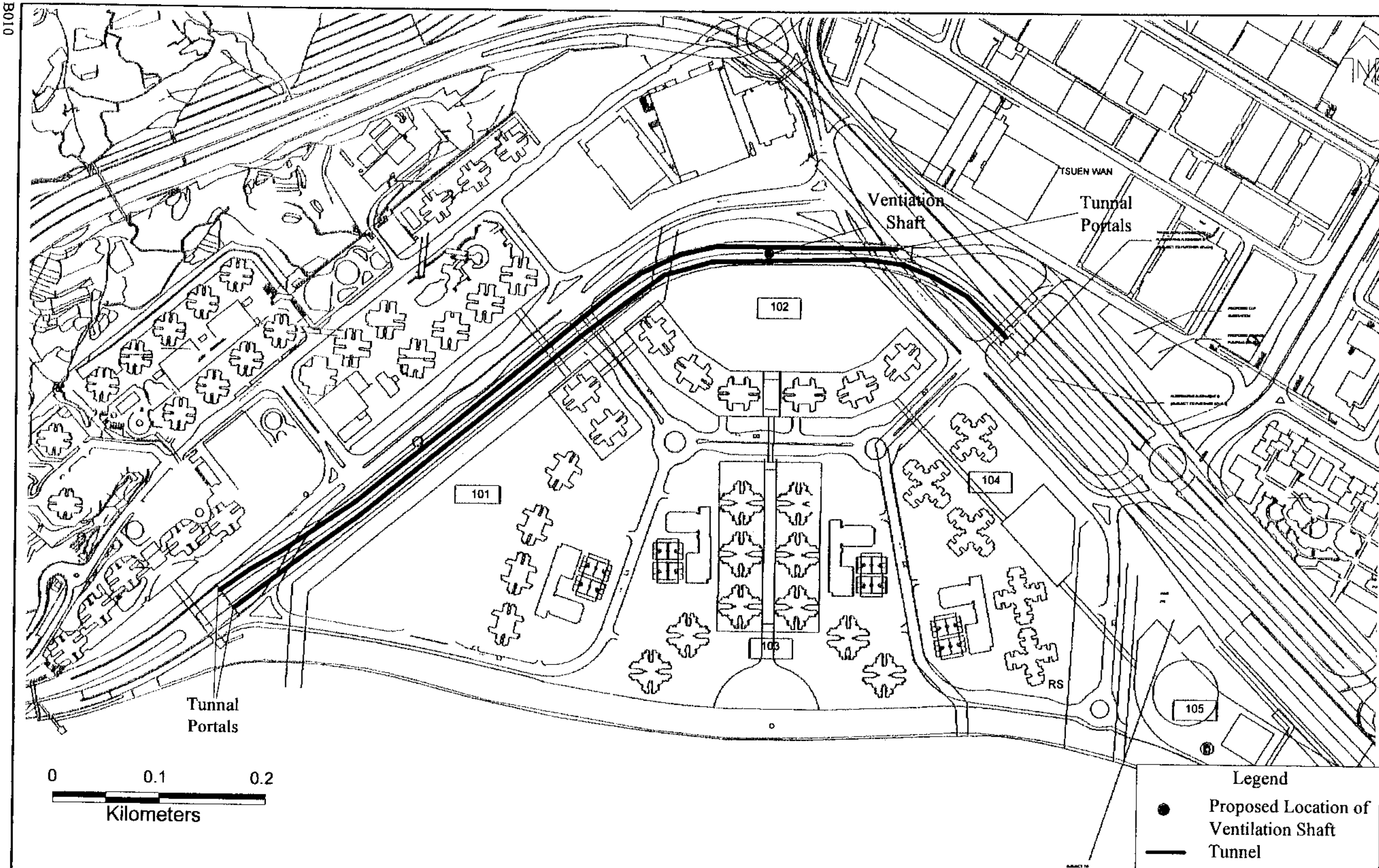
Eastern Portal

| | |
|---|---|
| Traffic Flow, F (veh/hr) | 1473 |
| Length of Tunnel, L (km) | 0.75 |
| Emission Factor (NOx), E (g/km/veh) | 1.824 |
| | |
| Portal Emission Rate (NOx), e (g/s) | 0.5597 |
| For $NO_2$, assuming 20% of NOx, e (g/s) | 0.1119 |

Western Portal

| | |
|---|---|
| Traffic Flow, F (veh/hr) | 299 |
| Length of Tunnel, L (km) | 0.86 |
| Emission Factor (NOx), E (g/km/veh) | 3.159 |
| | |
| Portal Emission Rate (NOx), e (g/s) | 0.2256 |
| For $NO_2$, assuming 20% of NOx, e (g/s) | 0.0451 |

* The composite vehicle emission factors for the tunnel bypass are shown in Table B2.1.

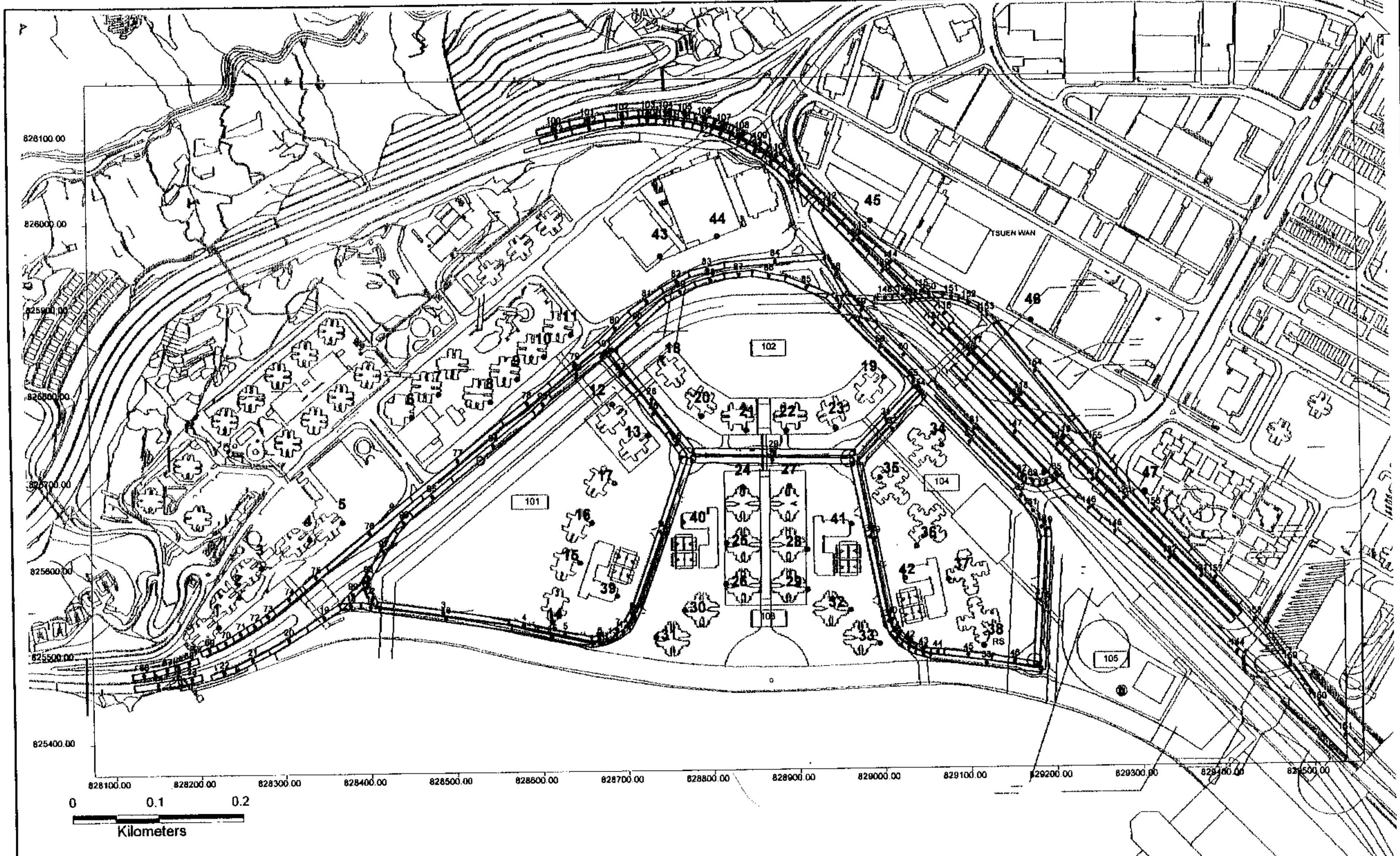



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

PROPOSED LOCATION OF THE VENTILATION SHAFT

| | |
|---|---|
| FIGURE | B2.1 |
| SCALE | 1 : 5000 |

B010




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

THE LOCATION PLAN OF THE REPRESENTATIVE ASRs AND THE MODELLED ROAD LINKS

| | |
|---|---|
| FIGURE | B2.2 |
| SCALE | 1 : 6300 |

B010

# Table B2.3
## Sample CALINE4 Input File

```
TWB Further Reclamation (at A43, 1.5m)
4Nitrogen Dioxide
  100.0000   1.0000     .0000     .0000   1 161   1.0000  0  0 0
828745.0   825958.0   1.5
  1  828395.6  825587.6  828398.0  825573.3  0.0  13.0    0.00    0.00  0
  1  828398.0  825573.3  828408.0  825559.7  0.0  13.0    0.00    0.00  0
  1  828408.0  825559.7  828561.6  825537.5  0.0  13.0    0.00    0.00  0
  1  828561.6  825537.5  828595.2  825529.4  0.0  13.0    0.00    0.00  0
  1  828595.2  825529.4  828657.6  825515.9  0.0  13.0    0.00    0.00  0
  1  828657.6  825515.9  828675.6  825518.2  0.0  13.0    0.00    0.00  0
  1  828675.6  825518.2  828699.8  825536.2  0.0  13.0    0.00    0.00  0
  1  828699.8  825536.2  828710.4  825554.8  0.0  13.0    0.00    0.00  0
  1  828710.4  825554.8  828769.6  825727.0  0.0  13.0    0.00    0.00  0
  1  828776.2  825725.0  828714.4  825553.8  0.0  13.0    0.00    0.00  0
  1  828714.4  825553.8  828701.6  825528.7  0.0  13.0    0.00    0.00  0
  1  828701.6  825528.7  828687.8  825519.4  0.0  13.0    0.00    0.00  0
  1  828687.8  825519.4  828676.1  825514.0  0.0  12.0    0.00    0.00  0
  1  828676.1  825514.0  828658.3  825510.4  0.0  13.0    0.00    0.00  0
  1  828658.3  825510.4  828564.6  825530.9  0.0  13.0    0.00    0.00  0
  1  828564.6  825530.9  828411.2  825553.9  0.0  13.0    0.00    0.00  0
  1  828411.2  825553.9  828389.9  825559.0  0.0  13.0    0.00    0.00  0
  1  828389.9  825559.0  828365.7  825557.3  0.0  13.0    0.00    0.00  0
  1  828365.7  825557.3  828326.9  825532.0  0.0  13.0    0.00    0.00  0
  1  828326.9  825532.0  828282.1  825505.8  0.0  13.0    0.00    0.00  0
  1  828282.1  825505.8  828243.0  825486.7  0.0  13.0    0.00    0.00  0
  1  828243.0  825486.7  828213.7  825476.6  0.0  13.0    0.00    0.00  0
  1  828202.4  825477.5  828178.2  825471.9  0.0  13.0    0.00    0.00  0
  1  828178.2  825471.9  828123.0  825464.9  0.0  13.0    0.00    0.00  0
  1  828769.5  825727.1  828750.4  825754.8  0.0  13.0    0.00    0.00  0
  1  829750.4  825754.8  828717.0  825796.8  0.0  13.0    0.00    0.00  0
  1  628717.0  825796.8  828675.4  825844.5  0.0  13.0    0.00    0.00  0
  1  828684.7  825850.9  828779.1  825733.4  0.0  13.0    0.00    0.00  0
  1  828778.7  825733.2  828968.2  825728.5  0.0  13.0    0.00    0.00  0
  1  828966.7  825719.4  828776.6  825723.6  0.0  13.0    0.00    0.00  0
  2  828968.3  625728.5  829042.7  825802.6 -0.3  13.0    0.00    0.00  0
  2  829050.8  825793.7  828974.7  825717.1 -0.3  13.0    0.00    0.00  0
  1  829182.7  825474.8  829053.4  825492.6  0.0  13.0    0.00    0.00  0
  1  829053.4  825492.6  829035.8  825498.0  0.0  13.0    0.00    0.00  0
  1  829035.8  825498.0  829019.7  825506.9  0.0  13.0    0.00    0.00  0
  1  829019.7  825506.9  829007.8  825521.2  0.0  13.0    0.00    0.00  0
  1  829007.8  825521.2  829001.2  825546.2  0.0  13.0    0.00    0.00  0
  1  829001.2  825546.2  828966.3  825718.5  0.0  13.0    0.00    0.00  0
  1  828974.2  625716.3  829006.3  825545.7  0.0  13.0    0.00    0.00  0
  1  829006.3  825545.7  829012.3  825526.8  0.0  13.0    0.00    0.00  0
  1  829012.3  825526.8  829022.5  825513.3  0.0  13.0    0.00    0.00  0
  1  829022.5  825513.3  829036.2  825503.8  0.0  13.0    0.00    0.00  0
  1  829036.2  825503.8  829053.8  825497.8  0.0  13.0    0.00    0.00  0
  1  829053.3  325497.8  829069.2  825496.8  0.0  13.0    0.00    0.00  0
  1  829069.2  825496.8  829124.8  825489.9  0.0  13.0    0.00    0.00  0
  1  829124.3  825489.9  829177.0  825480.7  0.0  13.0    0.00    0.00  0
  2  829176.9  825480.4  829186.8  825630.9 -0.3  13.0    0.00    0.00  0
  2  829186.8  825630.9  829181.2  825652.0 -0.5  13.0    0.00    0.00  0
  2  829189.8  825649.9  829192.7  825629.5 -0.5  13.0    0.00    0.00  0
  2  829192.7  825629.5  829183.0  825474.7 -0.3  13.0    0.00    0.00  0
  2  829181.8  825651.9  829166.6  825668.2 -0.5  13.0    0.00    0.00  0
  2  829166.6  825668.2  829154.1  825686.2 -0.5  13.0    0.00    0.00  0
  2  829154.1  825686.2  829050.6  825793.2 -0.5  13.0    0.00    0.00  0
  2  829050.6  825793.2  829043.1  825802.7 -0.5  11.0    0.00    0.00  0
  2  829043.1  825802.7  829033.4  825815.8 -0.5  13.0    0.00    0.00  0
  2  829033.4  825815.8  828966.6  825883.1 -0.3  13.0    0.00    0.00  0
  2  828966.6  825883.1  828940.4  825909.7 -0.1  13.0    0.00    0.00  0
  2  828938.8  825955.8  828961.3  825913.5 -0.1  13.0    0.00    0.00  0
  2  828961.3  825913.5  828996.1  825871.7 -0.3  13.0    0.00    0.00  0
  2  828996.1  825871.7  829057.9  825807.9 -0.5  13.0    0.00    0.00  0
  2  829057.9  825807.9  829158.2  825702.8 -0.5  13.0    0.00    0.00  0
  2  829158.2  825702.8  829166.8  825694.7 -0.5  11.0    0.00    0.00  0
  2  829166.8  825694.7  829183.2  825691.7 -0.5  13.0    0.00    0.00  0
  2  829183.2  825691.7  829197.7  825695.5 -0.5  13.0    0.00    0.00  0
  2  829197.7  825695.5  829207.6  825704.8 -0.5  13.0    0.00    0.00  0
  1  828121.1  925477.9  828146.6  825482.1  0.0  13.0    0.00    0.00  0
  1  828146.6  825482.1  828175.4  825489.5  0.0  13.0    0.00    0.00  0
  1  828175.4  825489.5  828198.6  825497.0  0.0  13.0    0.00    0.00  0
  1  828202.2  825504.4  828221.1  825511.7  0.0  13.0    0.00    0.00  0
  1  828221.1  925511.7  828240.1  825521.6  0.0  13.0    0.00    0.00  0
  1  828240.1  825521.6  828257.1  825531.6  0.0  13.0    0.00    0.00  0
  1  828257.1  825531.6  828273.0  825540.9  0.0  13.0    0.00    0.00  0
  1  828273.0  825540.9  828288.4  825552.2  0.0  13.0    0.00    0.00  0
  1  828288.4  825552.2  828323.4  825580.4  0.0  13.0    0.00    0.00  0
  1  828323.4  925580.4  828351.1  825603.0  0.0  13.0    0.00    0.00  0
  1  928351.1  825603.0  828450.2  825681.9  0.0  13.0    0.00    0.00  0
  1  828450.2  825681.9  828558.5  825767.4  0.0  13.0    0.00    0.00  0
  1  828558.5  825767.4  828613.8  825810.0  0.0  13.0    0.00    0.00  0
  1  828613.8  825810.0  828672.6  825857.8  0.0  13.0    0.00    0.00  0
  1  828672.6  825857.8  828708.8  825891.8  0.0  13.0    0.00    0.00  0
  1  828708.8  825891.8  828747.5  825919.0  0.0  13.0    0.00    0.00  0
  1  828747.5  825919.0  828778.9  825936.6  0.0  13.0    0.00    0.00  0
  1  828778.9  825936.6  828820.3  825946.9  0.0  13.0    0.00    0.00  0
  1  828820.3  825946.9  828938.4  825955.2  0.0  13.0    0.00    0.00  0
  1  828939.8  825909.7  828891.0  825930.0  0.0  13.0    0.00    0.00  0
  1  828891.0  825930.0  828852.7  825937.1  0.0  13.0    0.00    0.00  0
```

\b010\model\new_cal2\705sam2.dat

# Table B2.3
## Sample CALINE4 Input File

```
1  828852.7  825937.1  828820.0  825934.1   0.0  13.0   0.00   0.00   0
1  828820.0  825934.1  828785.7  825924.6   0.0  13.0   0.00   0.00   0
1  828785.7  825924.6  828750.0  825907.3   0.0  13.0   0.00   0.00   0
1  828750.0  825907.3  828684.7  825851.1   0.0  13.0   0.00   0.00   0
1  828684.7  825851.1  828675.5  825844.4   0.0  11.3   0.00   0.00   0
1  828675.5  825844.4  828614.5  825796.9   0.0  13.0   0.00   0.00   0
1  828614.5  825796.9  828594.7  825778.9   0.0  13.0   0.00   0.00   0
1  828594.7  825778.9  828498.2  825703.3   0.0  13.0   0.00   0.00   0
1  828498.2  825703.3  828450.0  825664.5   0.0  13.0   0.00   0.00   0
1  828450.0  825664.5  828431.2  825644.6   0.0  13.0   0.00   0.00   0
1  828431.2  825644.6  828402.4  825598.3   0.0  13.0   0.00   0.00   0
1  828402.4  825598.3  828394.8  825586.0   0.0  13.0   0.00   0.00   0
1  828394.8  825586.0  828365.7  825557.0   0.0  13.0   0.00   0.00   0
4  828603.3  826102.8  828641.9  826113.1  10.0  13.0   0.00   0.00   0
4  828641.9  826113.1  828682.0  826121.2  10.0  13.0   0.00   0.00   0
4  828682.0  826121.2  828722.5  826125.2  10.0  13.0   0.00   0.00   0
4  828722.5  826125.2  828743.1  826125.4  10.0  13.0   0.00   0.00   0
4  828743.1  826125.4  828764.4  826124.1  10.0  13.0   0.00   0.00   0
4  828764.4  826124.1  828787.8  826120.2  10.0  13.0   0.00   0.00   0
4  828787.8  826120.2  828810.3  826113.9  10.0  13.0   0.00   0.00   0
4  828810.3  826113.9  828832.6  826104.9  10.0  13.0   0.00   0.00   0
4  828832.6  826104.9  828853.6  826094.0  10.0  13.0   0.00   0.00   0
4  828853.6  826094.0  828873.4  826081.3  10.0  13.0   0.00   0.00   0
4  828873.4  826081.3  828891.5  826066.9  10.0  13.0   0.00   0.00   0
4  828891.5  826066.9  828926.7  826033.6  10.0  13.0   0.00   0.00   0
4  828926.7  826033.6  828960.6  825998.2  10.0  13.0   0.00   0.00   0
4  828960.6  825998.2  828995.8  825964.6  10.0  13.0   0.00   0.00   0
4  828995.8  825964.6  829031.3  825930.7  10.0  13.0   0.00   0.00   0
4  829031.3  825930.7  829066.5  825896.6  10.0  13.0   0.00   0.00   0
4  829066.5  825896.6  829084.8  825877.4  10.0  13.0   0.00   0.00   0
4  829082.7  825875.5  829138.7  825818.0  10.0  13.0   0.00   0.00   0
4  829138.7  825818.0  829187.1  825767.7  10.0  13.0   0.00   0.00   0
4  829187.1  825767.7  829236.2  825718.0  10.0  13.0   0.00   0.00   0
4  829236.2  825718.0  829325.1  825626.7  10.0  13.0   0.00   0.00   0
4  829325.1  825626.7  829413.5  825536.4  10.0  13.0   0.00   0.00   0
4  829406.2  825528.8  829259.5  825678.6  10.0  13.0   0.00   0.00   0
4  829259.5  825678.6  829228.5  825710.5  10.0  13.0   0.00   0.00   0
4  829228.5  825710.5  829179.5  825760.3  10.0  13.0   0.00   0.00   0
4  829179.5  825760.3  829130.9  825810.1  10.0  13.0   0.00   0.00   0
4  829130.9  825810.1  829074.6  825868.1  10.0  13.0   0.00   0.00   0
4  829072.1  825865.7  829053.8  825884.8  10.0  13.0   0.00   0.00   0
4  829053.8  825884.8  829020.7  825919.8  10.0  13.0   0.00   0.00   0
4  829020.7  825919.8  828987.2  825956.0  10.0  13.0   0.00   0.00   0
4  828987.2  825956.0  828953.4  825991.0  10.0  13.0   0.00   0.00   0
4  828953.4  825991.0  828918.7  826026.1  10.0  13.0   0.00   0.00   0
4  828918.7  826026.1  828885.1  826058.9  10.0  13.0   0.00   0.00   0
4  828885.1  826058.9  828867.2  826072.7  10.0  13.0   0.00   0.00   0
4  828867.2  826072.7  828848.1  826084.7  10.0  13.0   0.00   0.00   0
4  828848.1  826084.7  828829.1  826095.0  10.0  13.0   0.00   0.00   0
4  828828.1  826095.0  828806.9  826103.5  10.0  13.0   0.00   0.00   0
4  828806.9  826103.5  828785.3  826109.3  10.0  13.0   0.00   0.00   0
4  828785.3  826109.3  828762.9  826113.2  10.0  13.0   0.00   0.00   0
4  828762.9  826113.2  828742.5  826115.5  10.0  13.0   0.00   0.00   0
4  828742.5  826115.5  828722.8  826115.6  10.0  13.0   0.00   0.00   0
4  828722.8  826115.6  828683.7  826112.0  10.0  13.0   0.00   0.00   0
4  828683.7  826112.0  828644.6  826103.2  10.0  13.0   0.00   0.00   0
4  828644.6  826103.2  828606.3  826092.9  10.0  13.0   0.00   0.00   0
4  829534.8  825366.9  829285.7  825621.4  10.0  13.0   0.00   0.00   0
4  829285.7  825621.4  829253.2  825649.4   8.0  13.0   0.00   0.00   0
4  829253.2  825649.4  829225.8  825674.7   6.5  13.0   0.00   0.00   0
1  829225.8  825674.7  829084.3  825826.0   0.0  13.0   0.00   0.00   0
2  828997.9  825907.1  829015.3  825906.3  -6.0  13.0   0.00   0.00   0
2  829015.3  825906.3  829041.8  825908.4  -4.5  13.0   0.00   0.00   0
2  829041.8  825908.4  829074.6  825908.6  -3.5  13.0   0.00   0.00   0
2  829074.6  825908.6  829093.3  825904.8  -2.5  13.0   0.00   0.00   0
2  829093.3  825904.8  829115.8  825895.0  -1.5  13.0   0.00   0.00   0
2  829115.8  825895.0  829135.1  825875.6  -0.5  13.0   0.00   0.00   0
1  829135.1  825875.6  829224.4  825763.4   4.0  13.0   0.00   0.00   0
4  829224.4  825763.4  829271.2  825706.6   8.0  13.0   0.00   0.00   0
4  829271.2  825706.6  829357.4  825611.4   9.0  13.0   0.00   0.00   0
4  829357.4  825611.4  829414.8  825549.6  10.0  13.0   0.00   0.00   0
4  829414.8  825549.6  829447.1  825512.8  10.0  13.0   0.00   0.00   0
4  829447.1  825512.8  829495.7  825443.4  10.0  13.0   0.00   0.00   0
4  829495.7  825443.4  829515.1  825418.0  10.0  13.0   0.00   0.00   0
4  829515.1  825418.0  829554.4  825373.3  10.0  13.0   0.00   0.00   0
111111NO2
385
385
385
385
385
385
385
385
385
248
248
248
248
248
```

\b010\model\new_cal2\705sam2.dat

Table B2.3

Sample CALINE4 Input File

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744
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744
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744
744
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218
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854
320
862
198
321
321
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321
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541
409
409
409
409
323
323
323
323
530
530
789
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689
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627
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690
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690
744
744
744
744
3084
3084
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3084
3084
```

Table B2.3
Sample CALINE4 Input File

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1473
1473
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1473
2603
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2603
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2603
2603
2603
2603
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0.5522
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0.8501
0.8501
0.8501
0.8501
0.8227
0.8227
0.8227
0.4795
0.5769
0.7181
0.5337
0.6436
0.6913
```

\b010\model\new_cal2\705sam2.dat

## Table B2.3
### Sample CALINE4 Input File

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0.6913
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0.6645
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0.6640
0.6640
0.6640
0.6988
0.6988
0.6473
0.6473
0.8052
0.8052
0.8052
0.8052
0.8052
0.8052
0.8052
0.9483
0.9483
0.9483
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0.9276
0.9276
0.7928
0.7928
1.3068
1.3068
```

## Table B2.3
Sample CALINE4 Input File

```
1.5116
1.5116
1.5116
1.5116
1.5116
1.7726
1.7726
1.7726
1.7726
1.7726
1.7726
1.7726
1.7726
1.7726
1.7726
1.7726
1.7726
1.7726
1.7726
1.7726
1.0529
1.0529
1.0529
1.0529
0.6080
0.6080
0.6080
0.6080
0.6080
0.6080
0.6304
0.6304
0.6304
0.6304
0.6304
0.6304
0.6304
0.6304
 110.0     1.0 4     500.0    12.0    0.0     25.00
```

\b010\model\new_cal2\705sam2.dat

# Table B2.4
## Sample CALINE4 Output File

```
CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
         JUNE 1989 VERSION
         PAGE   1

       JOB: TWB Further Reclamation (at A43, 1.5m)
       RUN: 1NO2
 POLLUTANT: Nitrogen Dioxide
 (NOTE: OUTPUT IN MICRO-GRAMS/METER**3. IGNORE PPM LABEL)
```

I. SITE VARIABLES

```
    U=   1.0 M/S              Z0= 100. CM          ALT=      0. (M)
  BRG= 110.0 DEGREES          VD=  0.0 CM/S
 CLAS=     4 (D)              VS=  0.0 CM/S
 MIXH=  500. M               AMB=  0.0 PPM
SIGTH=   12. DEGREES        TEMP= 25.0 DEGREE (C)
```

II. LINK VARIABLES

| LINK DESCRIPTION | LINK COORDINATES (M) X1 | Y1 | X2 | Y2 | TYPE | VPH | EF (G/MI) | H (M) | W (M) |
|---|---|---|---|---|---|---|---|---|---|
| AA. LINK AA | ***** | ***** | ***** | ***** | AG | 385 | 0.7 | 0.0 | 13.0 |
| AB. LINK AB | ***** | ***** | ***** | ***** | AG | 385 | 0.7 | 0.0 | 13.0 |
| AC. LINK AC | ***** | ***** | ***** | ***** | AG | 385 | 0.7 | 0.0 | 13.0 |
| AD. LINK AD | ***** | ***** | ***** | ***** | AG | 385 | 0.7 | 0.0 | 13.0 |
| AE. LINK AE | ***** | ***** | ***** | ***** | AG | 385 | 0.7 | 0.0 | 13.0 |
| AF. LINK AF | ***** | ***** | ***** | ***** | AG | 385 | 0.7 | 0.0 | 13.0 |
| AG. LINK AG | ***** | ***** | ***** | ***** | AG | 385 | 0.7 | 0.0 | 13.0 |
| AH. LINK AH | ***** | ***** | ***** | ***** | AG | 385 | 0.7 | 0.0 | 13.0 |
| AI. LINK AI | ***** | ***** | ***** | ***** | AG | 385 | 0.7 | 0.0 | 13.0 |
| AJ. LINK AJ | ***** | ***** | ***** | ***** | AG | 248 | 0.6 | 0.0 | 13.0 |
| AK. LINK AK | ***** | ***** | ***** | ***** | AG | 248 | 0.6 | 0.0 | 13.0 |
| AL. LINK AL | ***** | ***** | ***** | ***** | AG | 248 | 0.6 | 0.0 | 13.0 |
| AM. LINK AM | ***** | ***** | ***** | ***** | AG | 248 | 0.6 | 0.0 | 12.0 |
| AN. LINK AN | ***** | ***** | ***** | ***** | AG | 248 | 0.6 | 0.0 | 13.0 |
| AO. LINK AO | ***** | ***** | ***** | ***** | AG | 248 | 0.6 | 0.0 | 13.0 |
| AP. LINK AP | ***** | ***** | ***** | ***** | AG | 248 | 0.6 | 0.0 | 13.0 |
| AQ. LINK AQ | ***** | ***** | ***** | ***** | AG | 248 | 0.6 | 0.0 | 13.0 |
| AR. LINK AR | ***** | ***** | ***** | ***** | AG | 248 | 0.6 | 0.0 | 13.0 |
| AS. LINK AS | ***** | ***** | ***** | ***** | AG | 744 | 0.9 | 0.0 | 13.0 |
| AT. LINK AT | ***** | ***** | ***** | ***** | AG | 744 | 0.9 | 0.0 | 13.0 |
| AU. LINK AU | ***** | ***** | ***** | ***** | AG | 744 | 0.9 | 0.0 | 13.0 |
| AV. LINK AV | ***** | ***** | ***** | ***** | AG | 744 | 0.9 | 0.0 | 13.0 |
| AW. LINK AW | ***** | ***** | ***** | ***** | AG | 744 | 0.9 | 0.0 | 13.0 |
| AX. LINK AX | ***** | ***** | ***** | ***** | AG | 744 | 0.9 | 0.0 | 13.0 |
| AY. LINK AY | ***** | ***** | ***** | ***** | AG | 218 | 0.8 | 0.0 | 13.0 |
| AZ. LINK AZ | ***** | ***** | ***** | ***** | AG | 218 | 0.8 | 0.0 | 13.0 |
| BA. LINK BA | ***** | ***** | ***** | ***** | AG | 218 | 0.8 | 0.0 | 13.0 |
| BB. LINK BB | ***** | ***** | ***** | ***** | AG | 532 | 0.5 | 0.0 | 13.0 |
| BC. LINK BC | ***** | ***** | ***** | ***** | AG | 854 | 0.6 | 0.0 | 13.0 |
| BD. LINK BD | ***** | ***** | ***** | ***** | AG | 320 | 0.7 | 0.0 | 13.0 |
| BE. LINK BE | ***** | ***** | ***** | ***** | DP | 862 | 0.5 | -0.3 | 13.0 |
| BF. LINK BF | ***** | ***** | ***** | ***** | DP | 198 | 0.6 | -0.3 | 13.0 |
| BG. LINK BG | ***** | ***** | ***** | ***** | AG | 321 | 0.7 | 0.0 | 13.0 |
| BH. LINK BH | ***** | ***** | ***** | ***** | AG | 321 | 0.7 | 0.0 | 13.0 |
| BI. LINK BI | ***** | ***** | ***** | ***** | AG | 321 | 0.7 | 0.0 | 13.0 |
| BJ. LINK BJ | ***** | ***** | ***** | ***** | AG | 321 | 0.7 | 0.0 | 13.0 |
| BK. LINK BK | ***** | ***** | ***** | ***** | AG | 541 | 0.6 | 0.0 | 13.0 |
| BL. LINK BL | ***** | ***** | ***** | ***** | AG | 541 | 0.6 | 0.0 | 13.0 |
| BM. LINK BM | ***** | ***** | ***** | ***** | AG | 409 | 0.7 | 0.0 | 13.0 |
| BN. LINK BN | ***** | ***** | ***** | ***** | AG | 409 | 0.7 | 0.0 | 13.0 |
| BO. LINK BO | ***** | ***** | ***** | ***** | AG | 409 | 0.7 | 0.0 | 13.0 |
| BP. LINK BP | ***** | ***** | ***** | ***** | AG | 409 | 0.7 | 0.0 | 13.0 |
| BQ. LINK BQ | ***** | ***** | ***** | ***** | AG | 323 | 0.7 | 0.0 | 13.0 |
| BR. LINK BR | ***** | ***** | ***** | ***** | AG | 323 | 0.7 | 0.0 | 13.0 |
| BS. LINK BS | ***** | ***** | ***** | ***** | AG | 323 | 0.7 | 0.0 | 13.0 |
| BT. LINK BT | ***** | ***** | ***** | ***** | AG | 323 | 0.7 | 0.0 | 13.0 |
| BU. LINK BU | ***** | ***** | ***** | ***** | DP | 530 | 0.7 | -0.3 | 13.0 |
| BV. LINK BV | ***** | ***** | ***** | ***** | DP | 530 | 0.7 | -0.5 | 13.0 |
| BW. LINK BW | ***** | ***** | ***** | ***** | DP | 789 | 0.6 | -0.5 | 13.0 |
| BX. LINK BX | ***** | ***** | ***** | ***** | DP | 789 | 0.6 | -0.3 | 13.0 |
| BY. LINK BY | ***** | ***** | ***** | ***** | DP | 689 | 0.8 | -0.5 | 13.0 |
| BZ. LINK BZ | ***** | ***** | ***** | ***** | DP | 689 | 0.8 | -0.5 | 13.0 |
| CA. LINK CA | ***** | ***** | ***** | ***** | DP | 689 | 0.8 | -0.5 | 13.0 |
| CB. LINK CB | ***** | ***** | ***** | ***** | DP | 689 | 0.8 | -0.5 | 11.0 |
| CC. LINK CC | ***** | ***** | ***** | ***** | DP | 689 | 0.8 | -0.5 | 13.0 |
| CD. LINK CD | ***** | ***** | ***** | ***** | DP | 689 | 0.8 | -0.3 | 13.0 |
| CE. LINK CE | ***** | ***** | ***** | ***** | DP | 689 | 0.8 | -0.1 | 13.0 |
| CF. LINK CF | ***** | ***** | ***** | ***** | DP | 1132 | 0.9 | -0.1 | 13.0 |
| CG. LINK CG | ***** | ***** | ***** | ***** | DP | 1132 | 0.9 | -0.3 | 13.0 |
| CH. LINK CH | ***** | ***** | ***** | ***** | DP | 1132 | 0.9 | -0.5 | 13.0 |
| CI. LINK CI | ***** | ***** | ***** | ***** | DP | 1132 | 0.9 | -0.5 | 13.0 |

# Table B2.4
## Sample CALINE4 Output File

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CJ. | LINK CJ | * ***** ***** ***** ***** * | DP | 1132 | 0.9 | -0.5 | 11.0 |
| CK. | LINK CK | * ***** ***** ***** ***** * | DP | 1132 | 0.9 | -0.5 | 13.0 |
| CL. | LINK CL | * ***** ***** ***** ***** * | DP | 1132 | 0.9 | -0.5 | 13.0 |
| CM. | LINK CM | * ***** ***** ***** ***** * | DP | 1132 | 0.9 | -0.5 | 13.0 |
| CN. | LINK CN | * ***** ***** ***** ***** * | AG | 1346 | 0.7 | 0.0 | 13.0 |
| CO. | LINK CO | * ***** ***** ***** ***** * | AG | 1346 | 0.7 | 0.0 | 13.0 |
| CP. | LINK CP | * ***** ***** ***** ***** * | AG | 1346 | 0.7 | 0.0 | 13.0 |
| CQ. | LINK CQ | * ***** ***** ***** ***** * | AG | 1346 | 0.7 | 0.0 | 13.0 |
| CR. | LINK CR | * ***** ***** ***** ***** * | AG | 1346 | 0.7 | 0.0 | 13.0 |
| CS. | LINK CS | * ***** ***** ***** ***** * | AG | 1346 | 0.7 | 0.0 | 13.0 |
| CT. | LINK CT | * ***** ***** ***** ***** * | AG | 1346 | 0.7 | 0.0 | 13.0 |
| CU. | LINK CU | * ***** ***** ***** ***** * | AG | 1346 | 0.7 | 0.0 | 13.0 |
| CV. | LINK CV | * ***** ***** ***** ***** * | AG | 1346 | 0.7 | 0.0 | 13.0 |
| CW. | LINK CW | * ***** ***** ***** ***** * | AG | 1346 | 0.7 | 0.0 | 13.0 |
| CX. | LINK CX | * ***** ***** ***** ***** * | AG | 1346 | 0.7 | 0.0 | 13.0 |
| CY. | LINK CY | * ***** ***** ***** ***** * | AG | 1477 | 0.7 | 0.0 | 13.0 |
| CZ. | LINK CZ | * ***** ***** ***** ***** * | AG | 1477 | 0.7 | 0.0 | 13.0 |
| DA. | LINK DA | * ***** ***** ***** ***** * | AG | 1477 | 0.7 | 0.0 | 13.0 |
| DB. | LINK DB | * ***** ***** ***** ***** * | AG | 1477 | 0.7 | 0.0 | 13.0 |
| DC. | LINK DC | * ***** ***** ***** ***** * | AG | 1477 | 0.7 | 0.0 | 13.0 |
| DD. | LINK DD | * ***** ***** ***** ***** * | AG | 1326 | 0.8 | 0.0 | 13.0 |
| DE. | LINK DE | * ***** ***** ***** ***** * | AG | 1326 | 0.8 | 0.0 | 13.0 |
| DF. | LINK DF | * ***** ***** ***** ***** * | AG | 1326 | 0.8 | 0.0 | 13.0 |
| DG. | LINK DG | * ***** ***** ***** ***** * | AG | 627 | 1.0 | 0.0 | 13.0 |
| DH. | LINK DH | * ***** ***** ***** ***** * | AG | 627 | 1.0 | 0.0 | 13.0 |
| DI. | LINK DI | * ***** ***** ***** ***** * | AG | 627 | 1.0 | 0.0 | 13.0 |
| DJ. | LINK DJ | * ***** ***** ***** ***** * | AG | 627 | 1.0 | 0.0 | 13.0 |
| DK. | LINK DK | * ***** ***** ***** ***** * | AG | 627 | 1.0 | 0.0 | 13.0 |
| DL. | LINK DL | * ***** ***** ***** ***** * | AG | 627 | 1.0 | 0.0 | 13.0 |
| DM. | LINK DM | * ***** ***** ***** ***** * | AG | 627 | 1.0 | 0.0 | 11.3 |
| DN. | LINK DN | * ***** ***** ***** ***** * | AG | 627 | 1.0 | 0.0 | 13.0 |
| DO. | LINK DO | * ***** ***** ***** ***** * | AG | 690 | 0.9 | 0.0 | 13.0 |
| DP. | LINK DP | * ***** ***** ***** ***** * | AG | 690 | 0.9 | 0.0 | 13.0 |
| DQ. | LINK DQ | * ***** ***** ***** ***** * | AG | 690 | 0.9 | 0.0 | 13.0 |
| DR. | LINK DR | * ***** ***** ***** ***** * | AG | 744 | 0.9 | 0.0 | 13.0 |
| DS. | LINK DS | * ***** ***** ***** ***** * | AG | 744 | 0.9 | 0.0 | 13.0 |
| DT. | LINK DT | * ***** ***** ***** ***** * | AG | 744 | 0.9 | 0.0 | 13.0 |
| DU. | LINK DU | * ***** ***** ***** ***** * | AG | 744 | 0.9 | 0.0 | 13.0 |
| DV. | LINK DV | * ***** ***** ***** ***** * | BG | 3084 | 0.9 | 10.0 | 13.0 |
| DW. | LINK DW | * ***** ***** ***** ***** * | BG | 3084 | 0.9 | 10.0 | 13.0 |
| DX. | LINK DX | * ***** ***** ***** ***** * | BG | 3084 | 0.9 | 10.0 | 13.0 |
| DY. | LINK DY | * ***** ***** ***** ***** * | BG | 3084 | 0.9 | 10.0 | 13.0 |
| DZ. | LINK DZ | * ***** ***** ***** ***** * | BG | 3084 | 0.9 | 10.0 | 13.0 |
| EA. | LINK EA | * ***** ***** ***** ***** * | BG | 3084 | 0.9 | 10.0 | 13.0 |
| EB. | LINK EB | * ***** ***** ***** ***** * | BG | 3084 | 0.9 | 10.0 | 13.0 |
| EC. | LINK EC | * ***** ***** ***** ***** * | BG | 3084 | 0.9 | 10.0 | 13.0 |
| ED. | LINK ED | * ***** ***** ***** ***** * | BG | 3084 | 0.9 | 10.0 | 13.0 |
| EE. | LINK EE | * ***** ***** ***** ***** * | BG | 3084 | 0.9 | 10.0 | 13.0 |
| EF. | LINK EF | * ***** ***** ***** ***** * | BG | 3084 | 0.9 | 10.0 | 13.0 |
| EG. | LINK EG | * ***** ***** ***** ***** * | BG | 3084 | 0.9 | 10.0 | 13.0 |
| EH. | LINK EH | * ***** ***** ***** ***** * | BG | 3084 | 0.9 | 10.0 | 13.0 |
| EI. | LINK EI | * ***** ***** ***** ***** * | BG | 3084 | 0.9 | 10.0 | 13.0 |
| EJ. | LINK EJ | * ***** ***** ***** ***** * | BG | 3084 | 0.9 | 10.0 | 13.0 |
| EK. | LINK EK | * ***** ***** ***** ***** * | BG | 3084 | 0.9 | 10.0 | 13.0 |
| EL. | LINK EL | * ***** ***** ***** ***** * | BG | 3084 | 0.9 | 10.0 | 13.0 |
| EM. | LINK EM | * ***** ***** ***** ***** * | BG | 3116 | 0.9 | 10.0 | 13.0 |
| EN. | LINK EN | * ***** ***** ***** ***** * | BG | 3116 | 0.9 | 10.0 | 13.0 |
| EO. | LINK EO | * ***** ***** ***** ***** * | BG | 3116 | 0.9 | 10.0 | 13.0 |
| EP. | LINK EP | * ***** ***** ***** ***** * | BG | 3820 | 0.8 | 10.0 | 13.0 |
| EQ. | LINK EQ | * ***** ***** ***** ***** * | BG | 3820 | 0.8 | 10.0 | 13.0 |
| ER. | LINK ER | * ***** ***** ***** ***** * | BG | 2040 | 1.3 | 10.0 | 13.0 |
| ES. | LINK ES | * ***** ***** ***** ***** * | BG | 2040 | 1.3 | 10.0 | 13.0 |
| ET. | LINK ET | * ***** ***** ***** ***** * | BG | 1642 | 1.5 | 10.0 | 13.0 |
| EU. | LINK EU | * ***** ***** ***** ***** * | BG | 1642 | 1.5 | 10.0 | 13.0 |
| EV. | LINK EV | * ***** ***** ***** ***** * | BG | 1642 | 1.5 | 10.0 | 13.0 |
| EW. | LINK EW | * ***** ***** ***** ***** * | BG | 1642 | 1.5 | 10.0 | 13.0 |
| EX. | LINK EX | * ***** ***** ***** ***** * | BG | 1642 | 1.5 | 10.0 | 13.0 |
| EY. | LINK EY | * ***** ***** ***** ***** * | BG | 1144 | 1.8 | 10.0 | 13.0 |
| EZ. | LINK EZ | * ***** ***** ***** ***** * | BG | 1144 | 1.8 | 10.0 | 13.0 |
| FA. | LINK FA | * ***** ***** ***** ***** * | BG | 1144 | 1.8 | 10.0 | 13.0 |
| FB. | LINK FB | * ***** ***** ***** ***** * | BG | 1144 | 1.8 | 10.0 | 13.0 |
| FC. | LINK FC | * ***** ***** ***** ***** * | BG | 1144 | 1.8 | 10.0 | 13.0 |
| FD. | LINK FD | * ***** ***** ***** ***** * | BG | 1144 | 1.8 | 10.0 | 13.0 |
| FE. | LINK FE | * ***** ***** ***** ***** * | BG | 1144 | 1.8 | 10.0 | 13.0 |
| FF. | LINK FF | * ***** ***** ***** ***** * | BG | 1144 | 1.8 | 10.0 | 13.0 |
| FG. | LINK FG | * ***** ***** ***** ***** * | BG | 1144 | 1.8 | 10.0 | 13.0 |
| FH. | LINK FH | * ***** ***** ***** ***** * | BG | 1144 | 1.8 | 10.0 | 13.0 |
| FI. | LINK FI | * ***** ***** ***** ***** * | BG | 1144 | 1.8 | 10.0 | 13.0 |
| FJ. | LINK FJ | * ***** ***** ***** ***** * | BG | 1144 | 1.8 | 10.0 | 13.0 |
| FK. | LINK FK | * ***** ***** ***** ***** * | BG | 1144 | 1.8 | 10.0 | 13.0 |
| FL. | LINK FL | * ***** ***** ***** ***** * | BG | 1144 | 1.8 | 10.0 | 13.0 |
| FM. | LINK FM | * ***** ***** ***** ***** * | BG | 1144 | 1.8 | 10.0 | 13.0 |
| FN. | LINK FN | * ***** ***** ***** ***** * | BG | 299 | 1.1 | 10.0 | 13.0 |
| FO. | LINK FO | * ***** ***** ***** ***** * | BG | 299 | 1.1 | 8.0 | 13.0 |
| FP. | LINK FP | * ***** ***** ***** ***** * | BG | 299 | 1.1 | 6.5 | 13.0 |
| FQ. | LINK FQ | * ***** ***** ***** ***** * | AG | 299 | 1.1 | 0.0 | 13.0 |
| FR. | LINK FR | * ***** ***** ***** ***** * | DP | 1473 | 0.6 | -6.0 | 13.0 |
| FS. | LINK FS | * ***** ***** ***** ***** * | DP | 1473 | 0.6 | -4.5 | 13.0 |
| FT. | LINK FT | * ***** ***** ***** ***** * | DP | 1473 | 0.6 | -3.5 | 13.0 |
| FU. | LINK FU | * ***** ***** ***** ***** * | DP | 1473 | 0.6 | -2.5 | 13.0 |

## Table B2.4
### Sample CALINE4 Output File

```
FV. LINK FV        * ***** ***** ***** ***** *  DP   1473   0.6   -1.5  13.0
FW. LINK FW        * ***** ***** ***** ***** *  DP   1473   0.6   -0.5  13.0
FX. LINK FX        * ***** ***** ***** ***** *  AG   2603   0.6    4.0  13.0
FY. LINK FY        * ***** ***** ***** ***** *  BG   2603   0.6    8.0  13.0
FZ. LINK FZ        * ***** ***** ***** ***** *  BG   2603   0.6    9.0  13.0
GA. LINK GA        * ***** ***** ***** ***** *  BG   2603   0.6   10.0  13.0
GB. LINK GB        * ***** ***** ***** ***** *  BG   2603   0.6   10.0  13.0
GC. LINK GC        * ***** ***** ***** ***** *  BG   2603   0.6   10.0  13.0
GD. LINK GD        * ***** ***** ***** ***** *  BG   2603   0.6   10.0  13.0
GE. LINK GE        * ***** ***** ***** ***** *  BG   2603   0.6   10.0  13.0

III.  RECEPTOR LOCATIONS

              *     COORDINATES (M)
  RECEPTOR    *     X        Y       Z
 -------------*----------------------
 1. RECPT   1 * 828745  825958   1.5

IV.  MODEL RESULTS (PRED. CONC. INCLUDES AMB.)

             * PRED  *                      CONC/LINK
             * CONC  *                        (PPM)
 RECEPTOR    * (PPM) *  AA   AB   AC   AD   AE   AF   AG   AH   AI   AJ
 ------------*-------*---------------------------------------------------
 1. RECPT  1 * 110.0 *  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0

1

RUN ENDED
```

## Table B2.5
Sample ISCST Input File (Tunnel Portals Emissions)

```
TWB - Emissions from Tunnel Portals (at A43, 1.5m)
 1 3 1-1 0 2 1 0 0 0 0 0 0 0 0 1 0 2 3 1 1 0 1 1 1 2 2 2 2 1                          0.000000  0.00000000
   28     0     0     1     0     0     1     1
 828745.0  825958.0  5.000000   1.50000
 10.00000  1.540000  3.090000  5.140000  8.230000  10.80000
1000000.0.000000(GRAMS/SEC) (MICROGRAMS/CUBIC METER)
    110 000.014920 828998 8259025.000010.0004.65103.25600.00000.00000.00000.0000
    210 000.014920 829004 8259025.000010.0004.65103.25600.00000.00000.00000.0000
    310 000.014920 829012 8259025.000010.0004.65103.25600.00000.00000.00000.0000
    410 000.014920 829018 8259025.000010.0004.65103.25600.00000.00000.00000.0000
    510 000.014920 829026 8259025.000010.0004.65103.25600.00000.00000.00000.0000
    610 000.014920 829032 8259025.000010.0004.65103.25600.00000.00000.00000.0000
    710 000.014920 829040 8259025.000010.0004.65103.25600.00000.00000.00000.0000
    810 000.007460 829046 8259025.000010.0004.65103.25600.00000.00000.00000.0000
    910 000.007460 829054 8259025.000010.0004.65103.25600.00000.00000.00000.0000
   1010 000.007460 829060 8259025.000010.0004.65103.25600.00000.00000.00000.0000
   1110 000.007460 829068 8259025.000010.0004.65103.25600.00000.00000.00000.0000
   1210 000.007460 829074 8259025.000010.0004.65103.25600.00000.00000.00000.0000
   1310 000.007460 829082 8259025.000010.0004.65103.25600.00000.00000.00000.0000
   1410 000.007460 829088 8259025.000010.0004.65103.25600.00000.00000.00000.0000
   1510 000.006020 828357 8255665.000010.0004.65103.25600.00000.00000.00000.0000
   1610 000.006020 828352 8255625.000010.0004.65103.25600.00000.00000.00000.0000
   1710 000.006020 828346 8255585.000010.0004.65103.25600.00000.00000.00000.0000
   1810 000.006020 828340 8255545.000010.0004.65103.25600.00000.00000.00000.0000
   1910 000.006020 828334 8255505.000010.0004.65103.25600.00000.00000.00000.0000
   2010 000.006020 828329 8255465.000010.0004.65103.25600.00000.00000.00000.0000
   2110 000.006020 828323 8255425.000010.0004.65103.25600.00000.00000.00000.0000
   2210 000.003010 828318 8255385.000010.0004.65103.25600.00000.00000.00000.0000
   2310 000.003010 828312 8255345.000010.0004.65103.25600.00000.00000.00000.0000
   2410 000.003010 828306 8255305.000010.0004.65103.25600.00000.00000.00000.0000
   2510 000.003010 828300 8255255.000010.0004.65103.25600.00000.00000.00000.0000
   2610 000.003010 828295 8255215.000010.0004.65103.25600.00000.00000.00000.0000
   2710 000.003010 828289 8255175.000010.0004.65103.25600.00000.00000.00000.0000
   2810 000.003010 828284 8255135.000010.0004.65103.25600.00000.00000.00000.0000
       1290.00001.000000500.0000298.00000.000000        40.0000000.0000000
```

# Table B2.6

## Sample ISCST Output File (Tunnel Portals Emissions)

```
1                   ISCST - (DATED 90346)

                    IBM-PC VERSION (2.05)
                    (C) COPYRIGHT 1990, TRINITY CONSULTANTS, INC.
                    SERIAL NUMBER 5792 SOLD TO C.E.S.
                    RUN BEGAN ON 07-03-97 AT 10:00:14

1
                         *** TWB - Emissions from Tunnel Portals (at A43, 1.5m)        ***

          CALCULATE (CONCENTRATION=1,DEPOSITION=2)                                 ISW(1) =   1
          RECEPTOR GRID SYSTEM (RECTANGULAR=1 OR 3, POLAR=2 OR 4)                  ISW(2) =   3
          DISCRETE RECEPTOR SYSTEM (RECTANGULAR=1,POLAR=2)                         ISW(3) =   1
          TERRAIN ELEVATIONS ARE READ (YES=1,NO=0)                                 ISW(4) =   1
          CALCULATIONS ARE WRITTEN TO TAPE (YES=1,NO=0)                            ISW(5) =   0
          LIST ALL INPUT DATA (NO=0,YES=1,MET DATA ALSO=2)                         ISW(6) =   2

          COMPUTE AVERAGE CONCENTRATION (OR TOTAL DEPOSITION)
          WITH THE FOLLOWING TIME PERIODS:
            HOURLY (YES=1,NO=0)                                                    ISW(7) =   1
            2-HOUR (YES=1,NO=0)                                                    ISW(8) =   0
            3-HOUR (YES=1,NO=0)                                                    ISW(9) =   0
            4-HOUR (YES=1,NO=0)                                                   ISW(10) =   0
            6-HOUR (YES=1,NO=0)                                                   ISW(11) =   0
            8-HOUR (YES=1,NO=0)                                                   ISW(12) =   0
            12-HOUR (YES=1,NO=0)                                                  ISW(13) =   0
            24-HOUR (YES=1,NO=0)                                                  ISW(14) =   0
          PRINT 'N'-DAY TABLE(S) (YES=1,NO=0)                                     ISW(15) =   0

          PRINT THE FOLLOWING TYPES OF TABLES WHOSE TIME PERIODS ARE
          SPECIFIED BY ISW(7) THROUGH ISW(14):
            DAILY TABLES (YES=1,NO=0)                                             ISW(16) =   0
            HIGHEST & SECOND HIGHEST TABLES (YES=1,NO=0)                          ISW(17) =   1
            MAXIMUM 50 TABLES (YES=1,NO=0)                                        ISW(18) =   0
          METEOROLOGICAL DATA INPUT METHOD (PRE-PROCESSED=1,CARD=2)               ISW(19) =   2
          RURAL-URBAN OPTION (RU.=0,UR. MODE 1=1,UR. MODE 2=2,UR. MODE 3=3)       ISW(20) =   3
          WIND PROFILE EXPONENT VALUES (DEFAULTS=1,USER ENTERS=2,3)               ISW(21) =   1
          VERTICAL POT. TEMP. GRADIENT VALUES (DEFAULTS=1,USER ENTERS=2,3)        ISW(22) =   1
          SCALE EMISSION RATES FOR ALL SOURCES (NO=0,YES>0)                       ISW(23) =   0
          PROGRAM CALCULATES FINAL PLUME RISE ONLY (YES=1,NO=2)                   ISW(24) =   1
          PROGRAM ADJUSTS ALL STACK HEIGHTS FOR DOWNWASH (YES=2,NO=1)             ISW(25) =   1
          PROGRAM USES BUOYANCY INDUCED DISPERSION (YES=1,NO=2)                   ISW(26) =   1
          CONCENTRATIONS DURING CALM PERIODS SET = 0 (YES=1,NO=2)                 ISW(27) =   2
          REG. DEFAULT OPTION CHOSEN (YES=1,NO=2)                                 ISW(28) =   2
          TYPE OF POLLUTANT TO BE MODELLED (1=SO2,2=OTHER)                        ISW(29) =   2
          DEBUG OPTION CHOSEN (YES=1,NO=2)                                        ISW(30) =   2
          ABOVE GROUND (FLAGPOLE) RECEPTORS USED (YES=1,NO=0)                     ISW(31) =   1

          NUMBER OF INPUT SOURCES                                                 NSOURC =  28
          NUMBER OF SOURCE GROUPS (=0,ALL SOURCES)                                NGROUP =   0
          TIME PERIOD INTERVAL TO BE PRINTED (=0,ALL INTERVALS)                    IPERD =   0
          NUMBER OF X (RANGE) GRID VALUES                                         NXPNTS =   0
          NUMBER OF Y (THETA) GRID VALUES                                         NYPNTS =   0
          NUMBER OF DISCRETE RECEPTORS                                            NXWYPT =   1
          NUMBER OF HOURS PER DAY IN METEOROLOGICAL DATA                          NHOURS =   1
          NUMBER OF DAYS OF METEOROLOGICAL DATA                                    NDAYS =   1
          SOURCE EMISSION RATE UNITS CONVERSION FACTOR                                TK =.10000E+07
          HEIGHT ABOVE GROUND AT WHICH WIND SPEED WAS MEASURED                        ZR =  10.00  METERS
          LOGICAL UNIT NUMBER OF METEOROLOGICAL DATA                                IMET =   5
          ALLOCATED DATA STORAGE                                                   LIMIT = 43500 WORDS
          REQUIRED DATA STORAGE FOR THIS PROBLEM RUN                               MIMIT =  8047 WORDS
1
                         *** TWB - Emissions from Tunnel Portals (at A43, 1st floor)        ***


                           *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                                  (METERS/SEC)

                                   1.54,    3.09,    5.14,    8.23,   10.80,


                                       *** X,Y COORDINATES OF DISCRETE RECEPTORS ***
                                                    (METERS)

     ( 828745.0, 825958.0),   (
1

                         *** TWB - Emissions from Tunnel Portals (at A43, 1st floor)        ***


                                           * ELEVATION HEIGHTS IN METERS *
                                          * FOR THE DISCRETE RECEPTOR POINTS *

   - X -       - Y -          ELE.           - X -       - Y -        ELE.          - X -      - Y -        ELE.
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

# Table B2.6

## Sample ISCST Output File (Tunnel Portals Emissions)

```
 828745.0   825958.0        5.00000
1
```

*** TWB - Emissions from Tunnel Portals (at A43, 1st floor) ***

* ABOVE GROUND RECEPTOR HEIGHTS IN METERS *
* FOR THE DISCRETE RECEPTOR POINTS *

| - X - | - Y - | HGT. | - X - | - Y - | HGT. | - X - | - Y - | HGT. |
|---|---|---|---|---|---|---|---|---|
| 828745.0 | 825958.0 | 1.50000 | | | | | | |

1

*** TWB - Emissions from Tunnel Portals (at A43, 1st floor) ***

*** SOURCE DATA ***

| SOURCE NUMBER | TYPE | WAKE | NUMBER PART. CATS. | EMISSION RATE TYPE=0,1 (GRAMS/SEC) TYPE=2 (GRAMS/SEC) *PER METER**2 | X (METERS) | Y (METERS) | BASE ELEV. (METERS) | HEIGHT (METERS) | TEMP. TYPE=0 (DEG.K); VERT.DIM TYPE=1 (METERS) | EXIT VEL. TYPE=0 (M/SEC); HORZ.DIM TYPE=1,2 (METERS) | DIAMETER TYPE=0 (METERS) | BLDG. HEIGHT TYPE=0 (METERS) | BLDG. LENGTH TYPE=0 (METERS) | BLDG. WIDTH TYPE=0 (METERS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 0 | 0 | .14920E-01 | 828998.0 | 825902.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 2 | 1 | 0 | 0 | .14920E-01 | 829004.0 | 825902.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 3 | 1 | 0 | 0 | .14920E-01 | 829012.0 | 825902.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 4 | 1 | 0 | 0 | .14920E-01 | 829018.0 | 825902.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 5 | 1 | 0 | 0 | .14920E-01 | 829026.0 | 825902.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 6 | 1 | 0 | 0 | .14920E-01 | 829032.0 | 825902.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 7 | 1 | 0 | 0 | .14920E-01 | 829040.0 | 825902.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 8 | 1 | 0 | 0 | .74600E-02 | 829046.0 | 825902.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 9 | 1 | 0 | 0 | .74600E-02 | 829054.0 | 825902.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 10 | 1 | 0 | 0 | .74600E-02 | 829060.0 | 825902.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 11 | 1 | 0 | 0 | .74600E-02 | 829068.0 | 825902.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 12 | 1 | 0 | 0 | .74600E-02 | 829074.0 | 825902.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 13 | 1 | 0 | 0 | .74600E-02 | 829082.0 | 825902.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 14 | 1 | 0 | 0 | .74600E-02 | 829088.0 | 825902.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 15 | 1 | 0 | 0 | .60200E-02 | 828357.0 | 825566.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 16 | 1 | 0 | 0 | .60200E-02 | 828352.0 | 825562.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 17 | 1 | 0 | 0 | .60200E-02 | 828346.0 | 825558.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 18 | 1 | 0 | 0 | .60200E-02 | 828340.0 | 825554.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 19 | 1 | 0 | 0 | .60200E-02 | 828334.0 | 825550.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 20 | 1 | 0 | 0 | .60200E-02 | 828329.0 | 825546.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 21 | 1 | 0 | 0 | .60200E-02 | 828323.0 | 825542.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 22 | 1 | 0 | 0 | .30100E-02 | 828318.0 | 825538.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 23 | 1 | 0 | 0 | .30100E-02 | 828312.0 | 825534.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 24 | 1 | 0 | 0 | .30100E-02 | 828306.0 | 825530.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 25 | 1 | 0 | 0 | .30100E-02 | 828300.0 | 825525.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 26 | 1 | 0 | 0 | .30100E-02 | 828295.0 | 825521.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 27 | 1 | 0 | 0 | .30100E-02 | 828289.0 | 825517.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |
| 28 | 1 | 0 | 0 | .30100E-02 | 828284.0 | 825513.0 | 5.0 | 10.00 | 4.65 | 3.26 | .00 | .00 | .00 | .00 |

MET.

1

DATA DAY

1

*** TWB - Emissions from Tunnel Portals (at A43, 1st floor) ***

* METEOROLOGICAL DATA FOR DAY 1 *

| HOUR | FLOW VECTOR (DEGREES) | WIND SPEED (MPS) | MIXING HEIGHT (METERS) | TEMP. (DEG. K) | POT. TEMP. GRADIENT (DEG. K PER METER) | STABILITY CATEGORY | WIND PROFILE EXPONENT | DECAY COEFFICIENT (PER SEC) |
|---|---|---|---|---|---|---|---|---|
| 1 | 290.0 | 1.00 | 500.0 | 298.0 | .0000 | 4 | .2500 | .000000E+00 |

HIGH
1-HR
SGROUP#

1

1

*** TWB - Emissions from Tunnel Portals (at A43, 1st floor) ***

* HIGHEST 1-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *
* FROM ALL SOURCES *
* FOR THE DISCRETE RECEPTOR POINTS *

| - X - | - Y - | CON. | (DAY,HOUR) | - X - | - Y - | CON. | (DAY,HOUR) |
|---|---|---|---|---|---|---|---|
| 828745.0 | 825958.0 | 15.17591 | ( 1, 1) | | | | |

\b010\model\new_cal2\tpsam.lst

Table B2.6
Sample ISCST Output File (Tunnel Portals Emissions)

```
1
HIGH                                                                                      2ND

                                                                                          1-HR
1                                                                                      SGROUP#
                  *** TWB - Emissions from Tunnel Portals (at A43, 1st floor)    ***

          * SECOND HIGHEST  1-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)      *
                                  * FROM ALL SOURCES *
                             * FOR THE DISCRETE RECEPTOR POINTS *

        - X -      - Y -       CON.     (DAY,HOUR)        - X -      - Y -       CON.     (DAY,HOUR)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
-

      828745.0   825958.0      .00000  (  0,  0)
RUN ENDED ON 07-03-97 AT 10:00:14
```

# Table B2.7

## Sample ISCST Input File (Ventilation Shaft Emission)

```
Tsuen Wan Bay - Tunnel Ventilation Shaft (at A43, 1.5m)
 1 3 1-1 0 2 1 0 0 0 0 0 0 0 0 1 0 2 3 1 1 0 2 2 1 2 2 2 2 1                0.000000  0.00000000
    1      0      0      1      0      0      1     1
  828745.0  825958.0  5.000000   1.50000
  10.00000  1.540000  3.090000  5.140000  8.230000  10.80000
1000000.0.000000(GRAMS/SEC) (MICROGRAMS/CUBIC METER)
    100 000.157000 828860 8259005.000015.000298.0010.0001.50000.00000.00000.0000
       1290.00001.000000500.0000298.00000.000000       40.0000000.0000000
```

# Table B2.8
## Sample ISCST Output File (Ventilation Shaft Emission)

```
1                       ISCST - (DATED 90346)

                        IBM-PC VERSION (2.05)
                        (C) COPYRIGHT 1990, TRINITY CONSULTANTS, INC.
                        SERIAL NUMBER 5792 SOLD TO C.E.S.
                        RUN BEGAN ON 07-04-97 AT 14:50:08

1
                   *** Tsuen Wan Bay - Tunnel Ventilation Shaft (at A43, 1.5m) ***

  CALCULATE (CONCENTRATION=1,DEPOSITION=2)                            ISW(1) =   1
  RECEPTOR GRID SYSTEM (RECTANGULAR=1 OR 3, POLAR=2 OR 4)             ISW(2) =   3
  DISCRETE RECEPTOR SYSTEM (RECTANGULAR=1,POLAR=2)                    ISW(3) =   1
  TERRAIN ELEVATIONS ARE READ (YES=1,NO=0)                            ISW(4) =   1
  CALCULATIONS ARE WRITTEN TO TAPE (YES=1,NO=0)                       ISW(5) =   0
  LIST ALL INPUT DATA (NO=0,YES=1,MET DATA ALSO=2)                    ISW(6) =   2

  COMPUTE AVERAGE CONCENTRATION (OR TOTAL DEPOSITION)
  WITH THE FOLLOWING TIME PERIODS:
    HOURLY (YES=1,NO=0)                                               ISW(7) =   1
    2-HOUR (YES=1,NO=0)                                               ISW(8) =   0
    3-HOUR (YES=1,NO=0)                                               ISW(9) =   0
    4-HOUR (YES=1,NO=0)                                              ISW(10) =   0
    6-HOUR (YES=1,NO=0)                                              ISW(11) =   0
    8-HOUR (YES=1,NO=0)                                              ISW(12) =   0
    12-HOUR (YES=1,NO=0)                                             ISW(13) =   0
    24-HOUR (YES=1,NO=0)                                             ISW(14) =   0
  PRINT 'N'-DAY TABLE(S) (YES=1,NO=0)                                ISW(15) =   0

  PRINT THE FOLLOWING TYPES OF TABLES WHOSE TIME PERIODS ARE
  SPECIFIED BY ISW(7) THROUGH ISW(14):
    DAILY TABLES (YES=1,NO=0)                                        ISW(16) =   0
    HIGHEST & SECOND HIGHEST TABLES (YES=1,NO=0)                     ISW(17) =   1
    MAXIMUM 50 TABLES (YES=1,NO=0)                                   ISW(18) =   0
  METEOROLOGICAL DATA INPUT METHOD (PRE-PROCESSED=1,CARD=2)          ISW(19) =   2
  RURAL-URBAN OPTION (RU.=0,UR. MODE 1=1,UR. MODE 2=2,UR. MODE 3=3)  ISW(20) =   3
  WIND PROFILE EXPONENT VALUES (DEFAULTS=1,USER ENTERS=2,3)          ISW(21) =   1
  VERTICAL POT. TEMP. GRADIENT VALUES (DEFAULTS=1,USER ENTERS=2,3)   ISW(22) =   1
  SCALE EMISSION RATES FOR ALL SOURCES (NO=0,YES>0)                  ISW(23) =   0
  PROGRAM CALCULATES FINAL PLUME RISE ONLY (YES=1,NO=2)              ISW(24) =   2
  PROGRAM ADJUSTS ALL STACK HEIGHTS FOR DOWNWASH (YES=2,NO=1)        ISW(25) =   2
  PROGRAM USES BUOYANCY INDUCED DISPERSION (YES=1,NO=2)              ISW(26) =   1
  CONCENTRATIONS DURING CALM PERIODS SET = 0 (YES=1,NO=2)            ISW(27) =   2
  REG. DEFAULT OPTION CHOSEN (YES=1,NO=2)                            ISW(28) =   2
  TYPE OF POLLUTANT TO BE MODELLED (1=SO2,2=OTHER)                   ISW(29) =   2
  DEBUG OPTION CHOSEN (YES=1,NO=2)                                   ISW(30) =   2
  ABOVE GROUND (FLAGPOLE) RECEPTORS USED (YES=1,NO=0)                ISW(31) =   1

  NUMBER OF INPUT SOURCES                                             NSOURC =   1
  NUMBER OF SOURCE GROUPS (=0,ALL SOURCES)                            NGROUP =   0
  TIME PERIOD INTERVAL TO BE PRINTED (=0,ALL INTERVALS)                IPERD =   0
  NUMBER OF X (RANGE) GRID VALUES                                     NXPNTS =   0
  NUMBER OF Y (THETA) GRID VALUES                                     NYPNTS =   0
  NUMBER OF DISCRETE RECEPTORS                                        NXWYPT =   1
  NUMBER OF HOURS PER DAY IN METEOROLOGICAL DATA                      NHOURS =   1
  NUMBER OF DAYS OF METEOROLOGICAL DATA                                NDAYS =   1
  SOURCE EMISSION RATE UNITS CONVERSION FACTOR                            TK =.10000E+07
  HEIGHT ABOVE GROUND AT WHICH WIND SPEED WAS MEASURED                    ZR =  10.00  METERS
  LOGICAL UNIT NUMBER OF METEOROLOGICAL DATA                            IMET =   5
  ALLOCATED DATA STORAGE                                               LIMIT = 43500 WORDS
  REQUIRED DATA STORAGE FOR THIS PROBLEM RUN                           MIMIT =   298 WORDS
1
                   *** Tsuen Wan Bay - Tunnel Ventilation Shaft (at A43, 1st floor) ***

                     *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                            (METERS/SEC)

                                 1.54,   3.09,   5.14,   8.23,  10.80,


                                *** X,Y COORDINATES OF DISCRETE RECEPTORS ***
                                               (METERS)

      ( 828745.0, 825958.0),  (
1

                   *** Tsuen Wan Bay - Tunnel Ventilation Shaft (at A43, 1st floor) ***


                                    * ELEVATION HEIGHTS IN METERS *
                                   * FOR THE DISCRETE RECEPTOR POINTS *

    - X -     - Y -       ELE.          - X -     - Y -       ELE.          - X -     - Y -       ELE.
  - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
  -
```

# Table B2.8
## Sample ISCST Output File (Ventilation Shaft Emission)

```
   828745.0   825958.0        5.00000
1

                                  *** Tsuen Wan Bay - Tunnel Ventilation Shaft (at A43, 1st floor) ***


                                           * ABOVE GROUND RECEPTOR HEIGHTS IN METERS *
                                             * FOR THE DISCRETE RECEPTOR POINTS *

    - X -      - Y -        HGT.            - X -      - Y -        HGT.            - X -      - Y -        HGT.
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
-

   828745.0   825958.0        1.50000
1
                                  *** Tsuen Wan Bay - Tunnel Ventilation Shaft (at A43, 1st floor) ***

                                                      *** SOURCE DATA ***

                            EMISSION RATE                                              TEMP.    EXIT VEL.
                              TYPE=0,1                                                 TYPE=0    TYPE=0
               T W          (GRAMS/SEC)                                               (DEG.K);  (M/SEC);            BLDG.    BLDG.    BLDG.
               Y A NUMBER     TYPE=2                                  BASE            VERT.DIM  HORZ.DIM DIAMETER  HEIGHT   LENGTH   WIDTH
  SOURCE P K  PART.   (GRAMS/SEC)      X          Y        ELEV.    HEIGHT   TYPE=1    TYPE=1,2  TYPE=0    TYPE=0   TYPE=0   TYPE=0
  NUMBER E E  CATS.  *PER METER**2  (METERS)   (METERS)  (METERS)  (METERS)  (METERS)  (METERS)  (METERS)  (METERS) (METERS) (METERS)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

      1  0 0    0    .15700E+00  828860.0  825900.0     5.0     15.00    298.00     10.00     1.50      .00      .00      .00
1                                                                                                                         MET.
DATA                                                                                                                       DAY

 1
                                  *** Tsuen Wan Bay - Tunnel Ventilation Shaft (at A43, 1st floor) ***

                                              * METEOROLOGICAL DATA FOR DAY   1 *

                                                                    POT. TEMP.
                          FLOW       WIND     MIXING                 GRADIENT                WIND      DECAY
                         VECTOR      SPEED    HEIGHT      TEMP.     (DEG. K     STABILITY   PROFILE   COEFFICIENT
                  HOUR  (DEGREES)    (MPS)   (METERS)   (DEG. K)   PER METER)   CATEGORY   EXPONENT   (PER SEC)
                  - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

                   1      290.0      1.00      500.0     298.0       .0000         4         .2500    .000000E+00
1                                                                                                                        HIGH
                                                                                                                         1-HR
                                                                                                                       SGROUP#

1
                                  *** Tsuen Wan Bay - Tunnel Ventilation Shaft (at A43, 1st floor) ***

                                 * HIGHEST  1-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)      *
                                                   * FROM ALL SOURCES *
                                             * FOR THE DISCRETE RECEPTOR POINTS *

                - X -      - Y -        CON.      (DAY,HOUR)            - X -      - Y -        CON.      (DAY,HOUR)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
-

              828745.0   825958.0     2.31415   (  1,  1)                                                                 2ND
1
HIGH                                                                                                                     1-HR
                                                                                                                       SGROUP#

1
                                  *** Tsuen Wan Bay - Tunnel Ventilation Shaft (at A43, 1st floor) ***

                             * SECOND HIGHEST  1-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)      *
                                                   * FROM ALL SOURCES *
                                             * FOR THE DISCRETE RECEPTOR POINTS *

                - X -      - Y -        CON.      (DAY,HOUR)            - X -      - Y -        CON.      (DAY,HOUR)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
-

              828745.0   825958.0      .00000   (  0,  0)

 RUN ENDED ON 07-04-97 AT 14:50:08
```

# Table B2.9

## Sample ISCST Input File (100% Tunnel Traffic Emission through Ventilation Shaft)

```
Tsuen Wan Bay - Tunnel Ventilation Shaft
 1 2 1-1 0 1 1 0 0 0 0 0 0 0 0 0 1 0 2 3 1 1 0 2 2 1 1 2 2 2 1                          0.000000  0.00000000
     1     20      8      0      0      0     5     16
  10.00000  20.00000  30.00000  40.00000  50.00000  60.00000  70.00000  80.00000
  90.00000  100.0000  110.0000  120.0000  130.0000  140.0000  150.0000  160.0000
  170.0000  180.0000  190.0000  200.0000
  0.000000  45.00000  90.00000  135.0000  180.0000  225.0000  270.0000  315.0000
  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000  5.000000
  5.000000  5.000000  5.000000  5.000000
  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000  25.00000
  25.00000  25.00000  25.00000  25.00000
  10.00000  1.540000  3.090000  5.140000  8.230000  10.80000
1000000.0.000000(GRAMS/SEC) (MICROGRAMS/CUBIC METER)
    100 000.1570000.000000.000005.000015.000298.0010.0001.50000.00000.00000.0000
       190.000001.000000500.0000298.00000.000000          20.0000000.000000
       190.000002.000000500.0000298.00000.000000          20.0000000.000000
       190.000004.000000500.0000298.00000.000000          20.0000000.000000
       190.000006.000000500.0000298.00000.000000          20.0000000.000000
       190.000008.000000500.0000298.00000.000000          20.0000000.000000
       290.000001.000000500.0000298.00000.000000          40.0000000.000000
       290.000002.000000500.0000298.00000.000000          40.0000000.000000
       290.000004.000000500.0000298.00000.000000          40.0000000.000000
       290.000006.000000500.0000298.00000.000000          40.0000000.000000
       290.000008.000000500.0000298.00000.000000          40.0000000.000000
       345.000001.000000500.0000298.00000.000000          20.0000000.000000
       345.000002.000000500.0000298.00000.000000          20.0000000.000000
       345.000004.000000500.0000298.00000.000000          20.0000000.000000
       345.000006.000000500.0000298.00000.000000          20.0000000.000000
       345.000008.000000500.0000298.00000.000000          20.0000000.000000
       445.000001.000000500.0000298.00000.000000          40.0000000.000000
       445.000002.000000500.0000298.00000.000000          40.0000000.000000
       445.000004.000000500.0000298.00000.000000          40.0000000.000000
       445.000006.000000500.0000298.00000.000000          40.0000000.000000
       445.000008.000000500.0000298.00000.000000          40.0000000.000000
       50.0000001.000000500.0000298.00000.000000          20.0000000.000000
       50.0000002.000000500.0000298.00000.000000          20.0000000.000000
       50.0000004.000000500.0000298.00000.000000          20.0000000.000000
       50.0000006.000000500.0000298.00000.000000          20.0000000.000000
       50.0000008.000000500.0000298.00000.000000          20.0000000.000000
       60.0000001.000000500.0000298.00000.000000          40.0000000.000000
       60.0000002.000000500.0000298.00000.000000          40.0000000.000000
       60.0000004.000000500.0000298.00000.000000          40.0000000.000000
       60.0000006.000000500.0000298.00000.000000          40.0000000.000000
       60.0000008.000000500.0000298.00000.000000          40.0000000.000000
       7135.00001.000000500.0000298.00000.000000          20.0000000.000000
       7135.00002.000000500.0000298.00000.000000          20.0000000.000000
```

# Table B2.9

Sample ISCST Input File (100% Tunnel Traffic Emission through Ventilation Shaft)

```
 7135.00004.000000500.0000298.00000.000000        20.0000000.000000
 7135.00006.000000500.0000298.00000.000000        20.0000000.000000
 7135.00008.000000500.0000298.00000.000000        20.0000000.000000
 8135.00001.000000500.0000298.00000.000000        40.0000000.000000
 8135.00002.000000500.0000298.00000.000000        40.0000000.000000
 8135.00004.000000500.0000298.00000.000000        40.0000000.000000
 8135.00006.000000500.0000298.00000.000000        40.0000000.000000
 8135.00008.000000500.0000298.00000.000000        40.0000000.000000
 9180.00001.000000500.0000298.00000.000000        20.0000000.000000
 9180.00002.000000500.0000298.00000.000000        20.0000000.000000
 9180.00004.000000500.0000298.00000.000000        20.0000000.000000
 9180.00006.000000500.0000298.00000.000000        20.0000000.000000
 9180.00008.000000500.0000298.00000.000000        20.0000000.000000
10180.00001.000000500.0000298.00000.000000        40.0000000.000000
10180.00002.000000500.0000298.00000.000000        40.0000000.000000
10180.00004.000000500.0000298.00000.000000        40.0000000.000000
10180.00006.000000500.0000298.00000.000000        40.0000000.000000
10180.00008.000000500.0000298.00000.000000        40.0000000.000000
11225.00001.000000500.0000298.00000.000000        20.0000000.000000
11225.00002.000000500.0000298.00000.000000        20.0000000.000000
11225.00004.000000500.0000298.00000.000000        20.0000000.000000
11225.00006.000000500.0000298.00000.000000        20.0000000.000000
11225.00008.000000500.0000298.00000.000000        20.0000000.000000
12225.00001.000000500.0000298.00000.000000        40.0000000.000000
12225.00002.000000500.0000298.00000.000000        40.0000000.000000
12225.00004.000000500.0000298.00000.000000        40.0000000.000000
12225.00006.000000500.0000298.00000.000000        40.0000000.000000
12225.00008.000000500.0000298.00000.000000        40.0000000.000000
13270.00001.000000500.0000298.00000.000000        20.0000000.000000
13270.00002.000000500.0000298.00000.000000        20.0000000.000000
13270.00004.000000500.0000298.00000.000000        20.0000000.000000
13270.00006.000000500.0000298.00000.000000        20.0000000.000000
13270.00008.000000500.0000298.00000.000000        20.0000000.000000
14270.00001.000000500.0000298.00000.000000        40.0000000.000000
14270.00002.000000500.0000298.00000.000000        40.0000000.000000
14270.00004.000000500.0000298.00000.000000        40.0000000.000000
14270.00006.000000500.0000298.00000.000000        40.0000000.000000
14270.00008.000000500.0000298.00000.000000        40.0000000.000000
15315.00001.000000500.0000298.00000.000000        20.0000000.000000
15315.00002.000000500.0000298.00000.000000        20.0000000.000000
15315.00004.000000500.0000298.00000.000000        20.0000000.000000
15315.00006.000000500.0000298.00000.000000        20.0000000.000000
15315.00008.000000500.0000298.00000.000000        20.0000000.000000
16315.00001.000000500.0000298.00000.000000        40.0000000.000000
16315.00002.000000500.0000298.00000.000000        40.0000000.000000
16315.00004.000000500.0000298.00000.000000        40.0000000.000000
16315.00006.000000500.0000298.00000.000000        40.0000000.000000
16315.00008.000000500.0000298.00000.000000        40.0000000.000000
```

# Table B2.10

Sample ISCST Output File (100% Tunnel Traffic Emisision through Ventilation Shaft)

```
1                ISCST - (DATED 90346)

                 IBM-PC VERSION (2.05)
                 (C) COPYRIGHT 1990, TRINITY CONSULTANTS, INC.
                 SERIAL NUMBER 5792 SOLD TO C.E.S.
                 RUN BEGAN ON 11-21-97 AT 11:27:31

1
                     *** Tsuen Wan Bay - Tunnel Ventilation Shaft                        ***

         CALCULATE (CONCENTRATION=1,DEPOSITION=2)                           ISW(1) =   1
         RECEPTOR GRID SYSTEM (RECTANGULAR=1 OR 3, POLAR=2 OR 4)            ISW(2) =   2
         DISCRETE RECEPTOR SYSTEM (RECTANGULAR=1,POLAR=2)                   ISW(3) =   1
         TERRAIN ELEVATIONS ARE READ (YES=1,NO=0)                           ISW(4) =   1
         CALCULATIONS ARE WRITTEN TO TAPE (YES=1,NO=0)                      ISW(5) =   0
         LIST ALL INPUT DATA (NO=0,YES=1,MET DATA ALSO=2)                   ISW(6) =   1

         COMPUTE AVERAGE CONCENTRATION (OR TOTAL DEPOSITION)
         WITH THE FOLLOWING TIME PERIODS:
           HOURLY (YES=1,NO=0)                                              ISW(7) =   1
           2-HOUR (YES=1,NO=0)                                              ISW(8) =   0
           3-HOUR (YES=1,NO=0)                                              ISW(9) =   0
           4-HOUR (YES=1,NO=0)                                             ISW(10) =   0
           6-HOUR (YES=1,NO=0)                                             ISW(11) =   0
           8-HOUR (YES=1,NO=0)                                             ISW(12) =   0
           12-HOUR (YES=1,NO=0)                                            ISW(13) =   0
           24-HOUR (YES=1,NO=0)                                            ISW(14) =   0
         PRINT 'N'-DAY TABLE(S) (YES=1,NO=0)                               ISW(15) =   0

         PRINT THE FOLLOWING TYPES OF TABLES WHOSE TIME PERIODS ARE
         SPECIFIED BY ISW(7) THROUGH ISW(14):
           DAILY TABLES (YES=1,NO=0)                                       ISW(16) =   0
           HIGHEST & SECOND HIGHEST TABLES (YES=1,NO=0)                    ISW(17) =   1
           MAXIMUM 50 TABLES (YES=1,NO=0)                                  ISW(18) =   0
         METEOROLOGICAL DATA INPUT METHOD (PRE-PROCESSED=1,CARD=2)         ISW(19) =   2
         RURAL-URBAN OPTION (RU.=0,UR. MODE 1=1,UR. MODE 2=2,UR. MODE 3=3) ISW(20) =   3
         WIND PROFILE EXPONENT VALUES (DEFAULTS=1,USER ENTERS=2,3)         ISW(21) =   1
         VERTICAL POT. TEMP. GRADIENT VALUES (DEFAULTS=1,USER ENTERS=2,3)  ISW(22) =   1
         SCALE EMISSION RATES FOR ALL SOURCES (NO=0,YES>0)                 ISW(23) =   0
         PROGRAM CALCULATES FINAL PLUME RISE ONLY (YES=1,NO=2)             ISW(24) =   2
         PROGRAM ADJUSTS ALL STACK HEIGHTS FOR DOWNWASH (YES=2,NO=1)       ISW(25) =   2
         PROGRAM USES BUOYANCY INDUCED DISPERSION (YES=1,NO=2)             ISW(26) =   1
         CONCENTRATIONS DURING CALM PERIODS SET = 0 (YES=1,NO=2)           ISW(27) =   2
         REG. DEFAULT OPTION CHOSEN (YES=1,NO=2)                           ISW(28) =   2
         TYPE OF POLLUTANT TO BE MODELLED (1=SO2,2=OTHER)                  ISW(29) =   2
         DEBUG OPTION CHOSEN (YES=1,NO=2)                                  ISW(30) =   2
         ABOVE GROUND (FLAGPOLE) RECEPTORS USED (YES=1,NO=0)               ISW(31) =   1

         NUMBER OF INPUT SOURCES                                            NSOURC =   1
         NUMBER OF SOURCE GROUPS (=0,ALL SOURCES)                           NGROUP =   0
         TIME PERIOD INTERVAL TO BE PRINTED (=0,ALL INTERVALS)               IPERD =   0
         NUMBER OF X (RANGE) GRID VALUES                                    NXPNTS =  20
         NUMBER OF Y (THETA) GRID VALUES                                    NYPNTS =   8
         NUMBER OF DISCRETE RECEPTORS                                       NXWYPT =   0
         NUMBER OF HOURS PER DAY IN METEOROLOGICAL DATA                     NHOURS =   5
         NUMBER OF DAYS OF METEOROLOGICAL DATA                               NDAYS =  16
         SOURCE EMISSION RATE UNITS CONVERSION FACTOR                           TK =.10000E+07
         HEIGHT ABOVE GROUND AT WHICH WIND SPEED WAS MEASURED                   ZR =  10.00  METERS
         LOGICAL UNIT NUMBER OF METEOROLOGICAL DATA                           IMET =   5
         ALLOCATED DATA STORAGE                                              LIMIT = 43500 WORDS
         REQUIRED DATA STORAGE FOR THIS PROBLEM RUN                          MIMIT =  1755 WORDS
1
                     *** Tsuen Wan Bay - Tunnel Ventilation Shaft                        ***

                   *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                           (METERS/SEC)

                           1.54,   3.09,   5.14,   8.23,  10.80,

                                  *** WIND PROFILE EXPONENTS ***
```

| STABILITY CATEGORY | WIND SPEED CATEGORY 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| A | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 |
| B | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 |
| C | .20000E+00 | .20000E+00 | .20000E+00 | .20000E+00 | .20000E+00 | .20000E+00 |
| D | .25000E+00 | .25000E+00 | .25000E+00 | .25000E+00 | .25000E+00 | .25000E+00 |
| E | .30000E+00 | .30000E+00 | .30000E+00 | .30000E+00 | .30000E+00 | .30000E+00 |
| F | .30000E+00 | .30000E+00 | .30000E+00 | .30000E+00 | .30000E+00 | .30000E+00 |

```
                         *** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
                                  (DEGREES KELVIN PER METER)

      STABILITY                            WIND SPEED CATEGORY
```

Table B2.10

Sample ISCST Output File (100% Tunnel Traffic Emisision through Ventilation Shaft)

| CATEGORY | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| A | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 |
| B | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 |
| C | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 |
| D | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 |
| E | .20000E-01 | .20000E-01 | .20000E-01 | .20000E-01 | .20000E-01 | .20000E-01 |
| F | .35000E-01 | .35000E-01 | .35000E-01 | .35000E-01 | .35000E-01 | .35000E-01 |

*** RANGES OF POLAR GRID SYSTEM ***
(METERS)

10.0, 20.0, 30.0, 40.0, 50.0, 60.0, 70.0, 80.0, 90.0, 100.0,
110.0, 120.0, 130.0, 140.0, 150.0, 160.0, 170.0, 180.0, 190.0, 200.0,

*** RADIAL ANGLES OF POLAR GRID SYSTEM ***

(DEGREES)

360.0, 45.0, 90.0, 135.0, 180.0, 225.0, 270.0, 315.0,

1

*** Tsuen Wan Bay - Tunnel Ventilation Shaft ***

* ELEVATION HEIGHTS IN METERS *
* FOR THE RECEPTOR GRID *

| DIRECTION / (DEGREES) / | RANGE (METERS) 10.0 | 20.0 | 30.0 | 40.0 | 50.0 | 60.0 | 70.0 | 80.0 | 90.0 |
|---|---|---|---|---|---|---|---|---|---|
| 315.0 / | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 |
| 270.0 / | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 |
| 225.0 / | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 |
| 180.0 / | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 |
| 135.0 / | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 |
| 90.0 / | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 |
| 45.0 / | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 |
| 360.0 / | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 |

1

*** Tsuen Wan Bay - Tunnel Ventilation Shaft ***

* ELEVATION HEIGHTS IN METERS *
* FOR THE RECEPTOR GRID *

| DIRECTION / (DEGREES) / | RANGE (METERS) 100.0 | 110.0 | 120.0 | 130.0 | 140.0 | 150.0 | 160.0 | 170.0 | 180.0 |
|---|---|---|---|---|---|---|---|---|---|
| 315.0 / | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 |
| 270.0 / | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 |
| 225.0 / | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 |
| 180.0 / | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 |
| 135.0 / | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 |
| 90.0 / | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 |
| 45.0 / | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 |
| 360.0 / | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 | 5.00000 |

1

*** Tsuen Wan Bay - Tunnel Ventilation Shaft ***

* ELEVATION HEIGHTS IN METERS *
* FOR THE RECEPTOR GRID *

| DIRECTION / (DEGREES) / | RANGE (METERS) 190.0 | 200.0 |
|---|---|---|
| 315.0 / | 5.00000 | 5.00000 |
| 270.0 / | 5.00000 | 5.00000 |
| 225.0 / | 5.00000 | 5.00000 |
| 180.0 / | 5.00000 | 5.00000 |
| 135.0 / | 5.00000 | 5.00000 |
| 90.0 / | 5.00000 | 5.00000 |

# Table B2.10

Sample ISCST Output File (100% Tunnel Traffic Emisision through Ventilation Shaft)

| | | |
|---|---|---|
| 45.0 / | 5.00000 | 5.00000 |
| 360.0 / | 5.00000 | 5.00000 |

1

*** Tsuen Wan Bay - Tunnel Ventilation Shaft ***

* ABOVE GROUND RECEPTOR HEIGHTS IN METERS *
* FOR THE RECEPTOR GRID *

| DIRECTION / (DEGREES) / | RANGE (METERS) 10.0 | 20.0 | 30.0 | 40.0 | 50.0 | 60.0 | 70.0 | 80.0 | 90.0 |
|---|---|---|---|---|---|---|---|---|---|
| 315.0 / | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 |
| 270.0 / | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 |
| 225.0 / | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 |
| 180.0 / | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 |
| 135.0 / | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 |
| 90.0 / | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 |
| 45.0 / | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 |
| 360.0 / | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 |

1

*** Tsuen Wan Bay - Tunnel Ventilation Shaft ***

* ABOVE GROUND RECEPTOR HEIGHTS IN METERS *
* FOR THE RECEPTOR GRID *

| DIRECTION / (DEGREES) / | RANGE (METERS) 100.0 | 110.0 | 120.0 | 130.0 | 140.0 | 150.0 | 160.0 | 170.0 | 180.0 |
|---|---|---|---|---|---|---|---|---|---|
| 315.0 / | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 |
| 270.0 / | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 |
| 225.0 / | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 |
| 180.0 / | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 |
| 135.0 / | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 |
| 90.0 / | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 |
| 45.0 / | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 |
| 360.0 / | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 | 25.00000 |

1

*** Tsuen Wan Bay - Tunnel Ventilation Shaft ***

* ABOVE GROUND RECEPTOR HEIGHTS IN METERS *
* FOR THE RECEPTOR GRID *

| DIRECTION / (DEGREES) / | RANGE (METERS) 190.0 | 200.0 |
|---|---|---|
| 315.0 / | 25.00000 | 25.00000 |
| 270.0 / | 25.00000 | 25.00000 |
| 225.0 / | 25.00000 | 25.00000 |
| 180.0 / | 25.00000 | 25.00000 |
| 135.0 / | 25.00000 | 25.00000 |
| 90.0 / | 25.00000 | 25.00000 |
| 45.0 / | 25.00000 | 25.00000 |
| 360.0 / | 25.00000 | 25.00000 |

1

*** Tsuen Wan Bay - Tunnel Ventilation Shaft ***

*** SOURCE DATA ***

| SOURCE NUMBER | TYPE | PEAK | NUMBER PART. CATS. | EMISSION RATE TYPE=0,1 (GRAMS/SEC) TYPE=2 (GRAMS/SEC) *PER METER**2 | X (METERS) | Y (METERS) | BASE ELEV. (METERS) | HEIGHT (METERS) | TEMP. TYPE=0 (DEG.K); VERT.DIM TYPE=1 (METERS) | EXIT VEL. TYPE=0 (M/SEC); HORZ.DIM TYPE=1,2 (METERS) | DIAMETER TYPE=0 (METERS) | BLDG. HEIGHT TYPE=0 (METERS) | BLDG. LENGTH TYPE=0 (METERS) | BLDG. WIDTH TYPE=0 (METERS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | .15700E+00 | .0 | .0 | 5.0 | 15.00 | 298.00 | 10.00 | 1.50 | .00 | .00 | .00 |

1

HIGH
1-HR
SGROUP#

1

\b010\model\vent\vent_25a.lst

# Table B2.10

Sample ISCST Output File (100% Tunnel Traffic Emisision through Ventilation Shaft)

*** Tsuen Wan Bay - Tunnel Ventilation Shaft ***

* HIGHEST 1-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *
* FROM ALL SOURCES *
* FOR THE RECEPTOR GRID *

* MAXIMUM VALUE EQUALS 527.65290 AND OCCURRED AT ( 10.0, 270.0) *

| DIRECTION / (DEGREES) / | RANGE (METERS) 10.0 | 20.0 | 30.0 | 40.0 | 50.0 |
|---|---|---|---|---|---|
| 315.0 / | 527.65280 ( 16, 3) | 324.66300 ( 16, 3) | 198.38480 ( 16, 3) | 128.71100 ( 16, 3) | 88.82077 ( 16, 3) |
| 270.0 / | 527.65290 ( 14, 3) | 324.66300 ( 14, 3) | 198.38480 ( 14, 3) | 128.71110 ( 14, 3) | 88.82079 ( 14, 3) |
| 225.0 / | 527.65290 ( 12, 3) | 324.66300 ( 12, 3) | 198.38480 ( 12, 3) | 128.71110 ( 12, 3) | 88.82079 ( 12, 3) |
| 180.0 / | 527.65290 ( 10, 3) | 324.66300 ( 10, 3) | 198.38480 ( 10, 3) | 128.71110 ( 10, 3) | 88.82079 ( 10, 3) |
| 135.0 / | 527.65290 ( 8, 3) | 324.66300 ( 8, 3) | 198.38480 ( 8, 3) | 128.71110 ( 8, 3) | 88.82079 ( 8, 3) |
| 90.0 / | 527.65290 ( 2, 3) | 324.66300 ( 2, 3) | 198.38480 ( 2, 3) | 128.71110 ( 2, 3) | 88.82079 ( 2, 3) |
| 45.0 / | 527.65290 ( 4, 3) | 324.66300 ( 4, 3) | 198.38480 ( 4, 3) | 128.71110 ( 4, 3) | 88.82079 ( 4, 3) |
| 360.0 / | 527.65290 ( 6, 3) | 324.66300 ( 6, 3) | 198.38480 ( 6, 3) | 128.71110 ( 6, 3) | 88.82079 ( 6, 3) |

1 HIGH 1-HR SGROUP#

1

*** Tsuen Wan Bay - Tunnel Ventilation Shaft ***

* HIGHEST 1-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *
* FROM ALL SOURCES *
* FOR THE RECEPTOR GRID *

* MAXIMUM VALUE EQUALS 527.65290 AND OCCURRED AT ( 10.0, 270.0) *

| DIRECTION / (DEGREES) / | RANGE (METERS) 60.0 | 70.0 | 80.0 | 90.0 | 100.0 |
|---|---|---|---|---|---|
| 315.0 / | 64.51179 ( 16, 3) | 52.70057 ( 16, 2) | 46.26143 ( 16, 2) | 40.52002 ( 16, 2) | 35.54059 ( 16, 2) |
| 270.0 / | 64.51180 ( 14, 3) | 52.70058 ( 14, 2) | 46.26143 ( 14, 2) | 40.52003 ( 14, 2) | 35.54060 ( 14, 2) |
| 225.0 / | 64.51180 ( 12, 3) | 52.70058 ( 12, 2) | 46.26143 ( 12, 2) | 40.52003 ( 12, 2) | 35.54060 ( 12, 2) |
| 180.0 / | 64.51180 ( 10, 3) | 52.70058 ( 10, 2) | 46.26143 ( 10, 2) | 40.52003 ( 10, 2) | 35.54060 ( 10, 2) |
| 135.0 / | 64.51180 ( 8, 3) | 52.70058 ( 8, 2) | 46.26143 ( 8, 2) | 40.52003 ( 8, 2) | 35.54060 ( 8, 2) |
| 90.0 / | 64.51180 ( 2, 3) | 52.70058 ( 2, 2) | 46.26143 ( 2, 2) | 40.52003 ( 2, 2) | 35.54060 ( 2, 2) |
| 45.0 / | 64.51180 ( 4, 3) | 52.70058 ( 4, 2) | 46.26143 ( 4, 2) | 40.52003 ( 4, 2) | 35.54060 ( 4, 2) |
| 360.0 / | 64.51180 ( 6, 3) | 52.70058 ( 6, 2) | 46.26143 ( 6, 2) | 40.52003 ( 6, 2) | 35.54060 ( 6, 2) |

1 HIGH 1-HR SGROUP#

1

*** Tsuen Wan Bay - Tunnel Ventilation Shaft ***

* HIGHEST 1-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *
* FROM ALL SOURCES *
* FOR THE RECEPTOR GRID *

* MAXIMUM VALUE EQUALS 527.65290 AND OCCURRED AT ( 10.0, 270.0) *

| DIRECTION / (DEGREES) / | RANGE (METERS) 110.0 | 120.0 | 130.0 | 140.0 | 150.0 |
|---|---|---|---|---|---|
| 315.0 / | 31.28848 ( 16, 2) | 27.69029 ( 16, 2) | 24.66177 ( 16, 2) | 22.11949 ( 16, 2) | 19.98577 ( 16, 2) |
| 270.0 / | 31.28848 ( 14, 2) | 27.69029 ( 14, 2) | 24.66177 ( 14, 2) | 22.11949 ( 14, 2) | 19.98577 ( 14, 2) |
| 225.0 / | 31.28848 ( 12, 2) | 27.69029 ( 12, 2) | 24.66177 ( 12, 2) | 22.11949 ( 12, 2) | 19.98577 ( 12, 2) |
| 180.0 / | 31.28848 ( 10, 2) | 27.69029 ( 10, 2) | 24.66177 ( 10, 2) | 22.11949 ( 10, 2) | 19.98577 ( 10, 2) |
| 135.0 / | 31.28848 ( 8, 2) | 27.69029 ( 8, 2) | 24.66177 ( 8, 2) | 22.11949 ( 8, 2) | 19.98577 ( 8, 2) |
| 90.0 / | 31.28848 ( 2, 2) | 27.69029 ( 2, 2) | 24.66177 ( 2, 2) | 22.11949 ( 2, 2) | 19.98577 ( 2, 2) |
| 45.0 / | 31.28848 ( 4, 2) | 27.69029 ( 4, 2) | 24.66177 ( 4, 2) | 22.11949 ( 4, 2) | 19.98577 ( 4, 2) |
| 360.0 / | 31.28848 ( 6, 2) | 27.69029 ( 6, 2) | 24.66177 ( 6, 2) | 22.11949 ( 6, 2) | 19.98577 ( 6, 2) |

1 HIGH 1-HR SGROUP#

1

*** Tsuen Wan Bay - Tunnel Ventilation Shaft ***

* HIGHEST 1-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *
* FROM ALL SOURCES *
* FOR THE RECEPTOR GRID *

* MAXIMUM VALUE EQUALS 527.65290 AND OCCURRED AT ( 10.0, 270.0) *

| DIRECTION / (DEGREES) / | RANGE (METERS) 160.0 | 170.0 | 180.0 | 190.0 | 200.0 |
|---|---|---|---|---|---|

# Table B2.10

Sample ISCST Output File (100% Tunnel Traffic Emisision through Ventilation Shaft)

| | | | | | |
|---|---|---|---|---|---|
| 315.0 / | 18.19097 ( 16, 2) | 16.67446 ( 16, 2) | 15.38480 ( 16, 2) | 14.51916 ( 16, 1) | 14.11516 ( 16, 1) |
| 270.0 / | 18.19097 ( 14, 2) | 16.67447 ( 14, 2) | 15.38480 ( 14, 2) | 14.51916 ( 14, 1) | 14.11516 ( 14, 1) |
| 225.0 / | 18.19097 ( 12, 2) | 16.67447 ( 12, 2) | 15.38480 ( 12, 2) | 14.51916 ( 12, 1) | 14.11516 ( 12, 1) |
| 180.0 / | 18.19097 ( 10, 2) | 16.67447 ( 10, 2) | 15.38480 ( 10, 2) | 14.51916 ( 10, 1) | 14.11516 ( 10, 1) |
| 135.0 / | 18.19097 ( 8, 2) | 16.67447 ( 8, 2) | 15.38480 ( 8, 2) | 14.51917 ( 8, 1) | 14.11516 ( 8, 1) |
| 90.0 / | 18.19097 ( 2, 2) | 16.67447 ( 2, 2) | 15.38480 ( 2, 2) | 14.51916 ( 2, 1) | 14.11516 ( 2, 1) |
| 45.0 / | 18.19097 ( 4, 2) | 16.67447 ( 4, 2) | 15.38480 ( 4, 2) | 14.51917 ( 4, 1) | 14.11516 ( 4, 1) |
| 360.0 / | 18.19097 ( 6, 2) | 16.67447 ( 6, 2) | 15.38480 ( 6, 2) | 14.51916 ( 6, 1) | 14.11516 ( 6, 1) |

1
HIGH 2ND 1-HR SGROUP#

1

*** Tsuen Wan Bay - Tunnel Ventilation Shaft ***

* SECOND HIGHEST 1-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *
* FROM ALL SOURCES *
* FOR THE RECEPTOR GRID *

* MAXIMUM VALUE EQUALS 341.50430 AND OCCURRED AT ( 10.0, 270.0) *

| DIRECTION / (DEGREES) / | RANGE (METERS) 10.0 | 20.0 | 30.0 | 40.0 | 50.0 |
|---|---|---|---|---|---|
| 315.0 / | 341.50430 ( 15, 3) | 189.38410 ( 16, 4) | 124.18200 ( 16, 4) | 82.82665 ( 16, 4) | 66.20659 ( 16, 2) |
| 270.0 / | 341.50430 ( 13, 3) | 189.38410 ( 14, 4) | 124.18200 ( 14, 4) | 82.82666 ( 14, 4) | 66.20659 ( 14, 2) |
| 225.0 / | 341.50430 ( 11, 3) | 189.38410 ( 12, 4) | 124.18200 ( 12, 4) | 82.82666 ( 12, 4) | 66.20659 ( 12, 2) |
| 180.0 / | 341.50430 ( 9, 3) | 189.38410 ( 10, 4) | 124.18200 ( 10, 4) | 82.82666 ( 10, 4) | 66.20659 ( 10, 2) |
| 135.0 / | 341.50430 ( 7, 3) | 189.38410 ( 8, 4) | 124.18200 ( 8, 4) | 82.82666 ( 8, 4) | 66.20659 ( 8, 2) |
| 90.0 / | 341.50430 ( 1, 3) | 189.38410 ( 2, 4) | 124.18200 ( 2, 4) | 82.82666 ( 2, 4) | 66.20659 ( 2, 2) |
| 45.0 / | 341.50430 ( 3, 3) | 189.38410 ( 4, 4) | 124.18200 ( 4, 4) | 82.82666 ( 4, 4) | 66.20659 ( 4, 2) |
| 360.0 / | 341.50430 ( 5, 3) | 189.38410 ( 6, 4) | 124.18200 ( 6, 4) | 82.82666 ( 6, 4) | 66.20659 ( 6, 2) |

1
HIGH 2ND 1-HR SGROUP#

1

*** Tsuen Wan Bay - Tunnel Ventilation Shaft ***

* SECOND HIGHEST 1-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *
* FROM ALL SOURCES *
* FOR THE RECEPTOR GRID *

* MAXIMUM VALUE EQUALS 341.50430 AND OCCURRED AT ( 10.0, 270.0) *

| DIRECTION / (DEGREES) / | RANGE (METERS) 60.0 | 70.0 | 80.0 | 90.0 | 100.0 |
|---|---|---|---|---|---|
| 315.0 / | 59.56351 ( 16, 2) | 48.80687 ( 16, 3) | 38.14866 ( 16, 3) | 30.62129 ( 16, 3) | 25.13797 ( 16, 3) |
| 270.0 / | 59.56350 ( 14, 2) | 48.80688 ( 14, 3) | 38.14866 ( 14, 3) | 30.62130 ( 14, 3) | 25.13798 ( 14, 3) |
| 225.0 / | 59.56350 ( 12, 2) | 48.80688 ( 12, 3) | 38.14866 ( 12, 3) | 30.62130 ( 12, 3) | 25.13798 ( 12, 3) |
| 180.0 / | 59.56350 ( 10, 2) | 48.80688 ( 10, 3) | 38.14866 ( 10, 3) | 30.62130 ( 10, 3) | 25.13798 ( 10, 3) |
| 135.0 / | 59.56350 ( 8, 2) | 48.80688 ( 8, 3) | 38.14866 ( 8, 3) | 30.62130 ( 8, 3) | 25.13798 ( 8, 3) |
| 90.0 / | 59.56350 ( 2, 2) | 48.80688 ( 2, 3) | 38.14866 ( 2, 3) | 30.62130 ( 2, 3) | 25.13798 ( 2, 3) |
| 45.0 / | 59.56350 ( 4, 2) | 48.80688 ( 4, 3) | 38.14866 ( 4, 3) | 30.62130 ( 4, 3) | 25.13798 ( 4, 3) |
| 360.0 / | 59.56350 ( 6, 2) | 48.80688 ( 6, 3) | 38.14866 ( 6, 3) | 30.62130 ( 6, 3) | 25.13798 ( 6, 3) |

1
HIGH 2ND 1-HR SGROUP#

1

*** Tsuen Wan Bay - Tunnel Ventilation Shaft ***

* SECOND HIGHEST 1-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *
* FROM ALL SOURCES *
* FOR THE RECEPTOR GRID *

* MAXIMUM VALUE EQUALS 341.50430 AND OCCURRED AT ( 10.0, 270.0) *

| DIRECTION / (DEGREES) / | RANGE (METERS) 110.0 | 120.0 | 130.0 | 140.0 | 150.0 |
|---|---|---|---|---|---|
| 315.0 / | 21.04978 ( 16, 3) | 17.94702 ( 16, 3) | 16.12991 ( 16, 1) | 16.08051 ( 16, 1) | 15.90133 ( 16, 1) |
| 270.0 / | 21.04978 ( 14, 3) | 17.94702 ( 14, 3) | 16.12991 ( 14, 1) | 16.08051 ( 14, 1) | 15.90133 ( 14, 1) |
| 225.0 / | 21.04978 ( 12, 3) | 17.94702 ( 12, 3) | 16.12991 ( 12, 1) | 16.08051 ( 12, 1) | 15.90133 ( 12, 1) |
| 180.0 / | 21.04978 ( 10, 3) | 17.94702 ( 10, 3) | 16.12991 ( 10, 1) | 16.08051 ( 10, 1) | 15.90133 ( 10, 1) |
| 135.0 / | 21.04978 ( 8, 3) | 17.94702 ( 8, 3) | 16.12991 ( 8, 1) | 16.08051 ( 8, 1) | 15.90133 ( 8, 1) |
| 90.0 / | 21.04978 ( 2, 3) | 17.94702 ( 2, 3) | 16.12991 ( 2, 1) | 16.08051 ( 2, 1) | 15.90133 ( 2, 1) |
| 45.0 / | 21.04978 ( 4, 3) | 17.94702 ( 4, 3) | 16.12991 ( 4, 1) | 16.08051 ( 4, 1) | 15.90133 ( 4, 1) |

# Table B2.10

Sample ISCST Output File (100% Tunnel Traffic Emisision through Ventilation Shaft)

| | | | | | |
|---|---|---|---|---|---|
| 360.0 / | 21.04978 ( 6, 3) | 17.94702 ( 6, 3) | 16.12991 ( 6, 1) | 15.08051 ( 6, 1) | 15.90133 ( 6, 1) |

1 2ND
HIGH 1-HR
SGROUP#

1

*** Tsuen Wan Bay - Tunnel Ventilation Shaft ***

* SECOND HIGHEST 1-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER) *
* FROM ALL SOURCES *
* FOR THE RECEPTOR GRID *

* MAXIMUM VALUE EQUALS 341.50430 AND OCCURRED AT ( 10.0, 270.0) *

| DIRECTION / (DEGREES) / | RANGE (METERS) 160.0 | 170.0 | 180.0 | 190.0 | 200.0 |
|---|---|---|---|---|---|
| 315.0 / | 15.62819 ( 16, 1) | 15.29156 ( 16, 1) | 14.91573 ( 16, 1) | 14.27923 ( 16, 2) | 13.32287 ( 16, 2) |
| 270.0 / | 15.62820 ( 14, 1) | 15.29156 ( 14, 1) | 14.91573 ( 14, 1) | 14.27923 ( 14, 2) | 13.32288 ( 14, 2) |
| 225.0 / | 15.62820 ( 12, 1) | 15.29156 ( 12, 1) | 14.91573 ( 12, 1) | 14.27923 ( 12, 2) | 13.32288 ( 12, 2) |
| 180.0 / | 15.62820 ( 10, 1) | 15.29156 ( 10, 1) | 14.91573 ( 10, 1) | 14.27923 ( 10, 2) | 13.32288 ( 10, 2) |
| 135.0 / | 15.62820 ( 8, 1) | 15.29156 ( 8, 1) | 14.91573 ( 8, 1) | 14.27923 ( 8, 2) | 13.32288 ( 8, 2) |
| 90.0 / | 15.62820 ( 2, 1) | 15.29156 ( 2, 1) | 14.91573 ( 2, 1) | 14.27923 ( 2, 2) | 13.32288 ( 2, 2) |
| 45.0 / | 15.62820 ( 4, 1) | 15.29156 ( 4, 1) | 14.91573 ( 4, 1) | 14.27923 ( 4, 2) | 13.32288 ( 4, 2) |
| 360.0 / | 15.62820 ( 6, 1) | 15.29156 ( 6, 1) | 14.91573 ( 6, 1) | 14.27923 ( 6, 2) | 13.32288 ( 6, 2) |

RUN ENDED ON 11-21-97 AT 11:27:32

**APPENDIX B3**

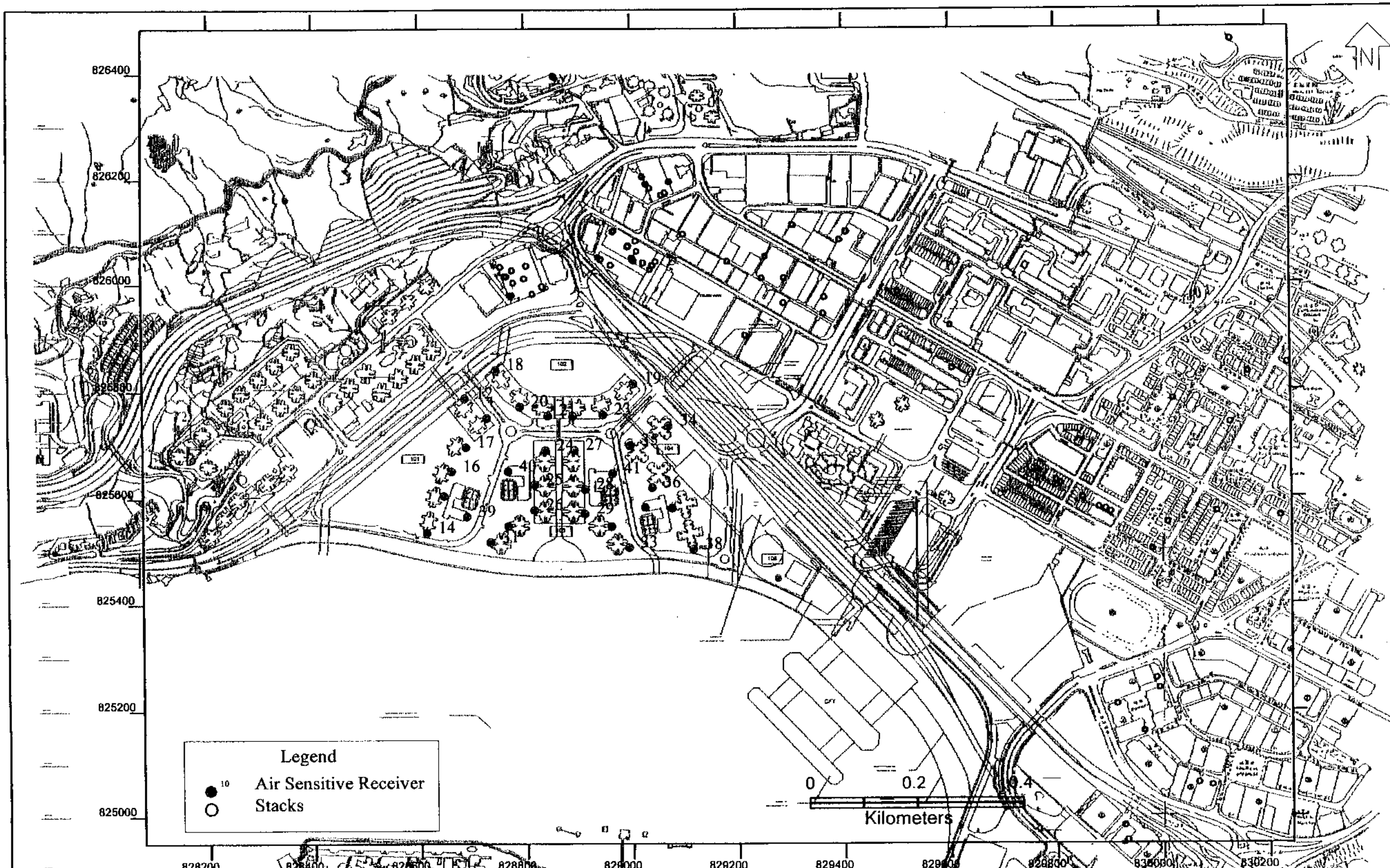
**AIR QUALITY ASSESSMENT METHODOLOGY (OPERATIONAL PHASE STACK EMISSIONS)**

The following three attachments are attached to this Appendix B3:

(i) Figure B3.1 Locations of Stacks and Selected Representative Air Sensitive Receivers within 1.5 km

(ii) Table B3.1 Sample ISCST Input File (ASR 18 - 1st Floor)

(iii) Table B3.2 Sample ISCST Output File (ASR 18 - 1st Floor)




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

LOCATIONS OF STACKS AND SELECTED REPRESENTATIVE AIR SENSITIVE RECEIVERS WITHIN 1.5KM

| | |
|---|---|
| FIGURE | B3.1 |
| SCALE | 1 : 10200 |

B010

# Table B3.1

## Sample ISCST Input File (ASR 18 - 1st Floor)

```
TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
 1 1 1 0 0 1 1 0 0 0 0 0 0 1 1 0 1 0 1 3 1 1 0 2 2 1 1 2 1 2 1                    0.000000  0.00000011
    76      0      0      1      0      0     24    365
 828744.9  825839.8         5.0     25.8
  65.00000  1.540000  3.090000  5.140000  8.230000  10.80000
1000000.0.000000(GRAMS/SEC)  (MICROGRAMS/CUBIC METER)
11111111111111111111111111111111111111111111111111111111111111111111111111111111
11111111111111111111111111111111111111111111111111111111111111111111111111111111
11111111111111111111111111111111111111111111111111111111111111111111111111111111
11111111111111111111111111111111111111111111111111111111111111111111111111111111
1111111111111111111111111111111111111111111111
 99999     93 99999     93
     100 030.951003828777.825980.  0.00114.00422.00  7.500.61000.00000.00000.0000
     200 032.176944828774.825980.  0.00108.10395.15  7.560.55000.00000.00000.0000
     300 030.177083828816.825982.  0.00114.70403.15  6.000.61500.00000.00000.0000
     400 030.295139828835.825996.  0.00112.00416.15  6.000.43000.00000.00000.0000
     500 031.109722828780.826003.  0.00115.00415.15  7.500.66000.00000.00000.0000
     600 030.546833828801.826011.  0.00114.90429.15  7.500.54000.00000.00000.0000
     700 030.432870828767.826015.  0.00 91.50412.15  6.000.60000.00000.00000.0000
     800 031.032986828764.826015.  0.00109.00412.15  7.500.75000.00000.00000.0000
     900 030.324653828778.826026.  0.00114.00422.00  6.000.61000.00000.00000.0000
    1000 030.275463828805.826035.  0.00 90.00473.15  6.000.45700.00000.00000.0000
    1100 030.157407828756.826033.  0.00102.00422.00  6.000.21500.00000.00000.0000
    1200 030.393519828945.826047.  0.00 74.50422.15  6.000.55900.00000.00000.0000
    1300 030.977011828964.826036.  0.00102.70466.15  7.500.56000.00000.00000.0000
    1400 030.196759828940.826051.  0.00 72.10427.15  6.000.38000.00000.00000.0000
    1500 030.104938829008.826044.  0.00 62.80416.15  6.000.31800.00000.00000.0000
    1600 031.377315829005.826047.  0.00 63.80439.15  7.500.54600.00000.00000.0000
    1700 030.306944829004.826050.  0.00 62.30443.15  6.000.45400.00000.00000.0000
    1800 030.150253829025.826040.  0.00 65.90403.15  6.000.34000.00000.00000.0000
    1900 030.295139829038.826028.  0.00 93.40422.00  6.000.51000.00000.00000.0000
    2000 030.188889828996.826071.  0.00 61.10450.15  6.000.35600.00000.00000.0000
    2100 030.165278828997.826073.  0.00 56.20466.15  6.000.43200.00000.00000.0000
    2200 030.209877829042.826035.  0.00 96.40413.15  6.000.47000.00000.00000.0000
    2300 030.118056829013.826062.  0.00 73.60439.15  6.000.75000.00000.00000.0000
    2400 030.314815828968.826100.  0.00 59.40466.15  6.000.45700.00000.00000.0000
    2500 031.318444828970.826102.  0.00 74.80429.15  7.500.64500.00000.00000.0000
    2600 031.026570828970.826102.  0.00 71.00455.15  7.500.75000.00000.00000.0000
    2700 030.432870829049.826042.  0.00 69.90450.15  6.000.56000.00000.00000.0000
    2800 030.078704829011.826082.  0.00 59.40393.15  6.000.30000.00000.00000.0000
    2900 030.035417829101.826095.  0.00 26.60422.00  6.000.44000.00000.00000.0000
    3000 030.983796829217.825903.  0.00 82.30422.00  7.500.22900.00000.00000.0000
    3100 030.250475829038.826183.  0.00 64.30473.15  6.000.43000.00000.00000.0000
    3200 031.869213829060.826170.  0.00 79.90422.00  7.500.90000.00000.00000.0000
    3300 030.265625829031.826191.  0.00 64.70427.15  6.000.43200.00000.00000.0000
    3400 030.134091829184.826043.  0.00 31.80422.00  6.000.71100.00000.00000.0000
    3500 030.177083829067.826174.  0.00 79.60436.15  6.000.46000.00000.00000.0000
    3600 031.377315829024.826205.  0.00 72.30422.15  7.500.63500.00000.00000.0000
    3700 030.295139829075.826195.  0.00 67.80422.15  6.000.41000.00000.00000.0000
    3800 030.028333829249.826011.  0.00102.00423.15  6.000.16000.00000.00000.0000
    3900 030.033333829290.825964.  0.00 91.60453.15  6.000.25800.00000.00000.0000
    4000 030.029514829256.826052.  0.00 93.30422.00  6.000.27000.00000.00000.0000
    4100 030.078704829291.826011.  0.00 98.50422.00  6.000.36000.00000.00000.0000
    4200 030.396667829365.825944.  0.00111.60422.00  6.000.47700.00000.00000.0000
    4300 030.052469829367.825975.  0.00109.80422.00  6.000.25400.00000.00000.0000
    4400 030.088889829307.826112.  0.00 45.10422.00  6.000.38000.00000.00000.0000
    4500 030.389583829309.826111.  0.00 45.10422.00  6.000.38000.00000.00000.0000
    4600 030.032760828858.826394.  0.00 19.10432.15  6.000.18000.00000.00000.0000
    4700 030.040321828857.826396.  0.00 23.20505.15  6.000.20300.00000.00000.0000
    4800 030.028333829396.826083.  0.00 93.50422.00  6.000.25000.00000.00000.0000
    4900 030.129861829407.826099.  0.00 97.80466.15  6.000.30000.00000.00000.0000
    5000 030.363182829409.826099.  0.00115.80430.15  6.000.38100.00000.00000.0000
    5100 030.014167829505.825986.  0.00 24.40422.00  6.000.25000.00000.00000.0000
    5200 030.118056829606.825841.  0.00 75.30422.00  6.000.30400.00000.00000.0000
    5300 030.022109829603.825921.  0.00 24.40422.00  6.000.25000.00000.00000.0000
    5400 030.008095829800.825633.  0.00 22.90422.00  6.000.25000.00000.00000.0000
    5500 030.010794829809.825627.  0.00 24.40422.00  6.000.25000.00000.00000.0000
    5600 030.029514829850.825600.  0.00 11.00422.00  6.000.22500.00000.00000.0000
    5700 030.015741829881.825581.  0.00 15.50422.00  6.000.30000.00000.00000.0000
    5800 030.023611829893.825578.  0.00 15.20422.00  6.000.25000.00000.00000.0000
    5900 030.014757829903.825572.  0.00 15.20422.00  6.000.20000.00000.00000.0000
    6000 030.031481829981.825502.  0.00 22.00463.15  6.000.22000.00000.00000.0000
    6100 030.021250830022.825783.  0.00 25.90422.00  6.000.25000.00000.00000.0000
    6200 030.019676830010.825552.  0.00 21.90422.00  6.000.22500.00000.00000.0000
    6300 030.118056829913.825212.  0.00 79.20436.15  6.000.40000.00000.00000.0000
    6400 030.410735829987.825261.  0.00 65.20453.15  6.000.75900.00000.00000.0000
    6500 030.236111829993.825242.  0.00 61.30422.00  6.000.25000.00000.00000.0000
    6600 030.013756830102.825572.  0.00 27.40422.00  6.000.30500.00000.00000.0000
    6700 030.052469829964.825161.  0.00 35.10422.00  6.000.30000.00000.00000.0000
    6800 030.129348830129.825739.  0.00 67.60427.15  6.000.38100.00000.00000.0000
    6900 030.027083830163.825833.  0.00 27.40422.00  6.000.30000.00000.00000.0000
    7000 030.022222829927.824982.  0.00107.50422.00  6.000.31000.00000.00000.0000
    7100 030.014167829932.824954.  0.00102.90422.00  6.000.27300.00000.00000.0000
    7200 030.135816830238.825848.  0.00 78.90422.00  6.000.38100.00000.00000.0000
    7300 030.147569830222.825564.  0.00 49.20429.15  6.000.35000.00000.00000.0000
    7400 030.351333830066.825063.  0.00100.30422.00  6.000.63600.00000.00000.0000
    7500 031.017614830091.825058.  0.00 76.80422.00  7.500.78400.00000.00000.0000
    7600 030.343434830135.826460.  0.00  8.50422.00  6.000.40600.00000.00000.0000
       1.00       1.00       1.00       1.00       1.00       1.00       1.00       1.00
       1.00       1.00       1.00       1.00       1.00       1.00       1.00       1.00
```

Table B3.1
Sample ISCST Input File (ASR 18 - 1st Floor)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 1.00 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

Table B3.1

Sample ISCST Input File (ASR 18 - 1st Floor)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.50 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.50 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.50 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.50 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Table B3.1
Sample ISCST Input File (ASR 18 - 1st Floor)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.50 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.50 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.50 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| 1.00 | 1.00 | 1.00 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 |

# Table B3.2

## Sample ISCST Output File (ASR 18 - 1st Floor)

```
1
                    ISCST - (DATED 90346)

                    IBM-PC VERSION (2.05)
                    (C) COPYRIGHT 1990, TRINITY CONSULTANTS, INC.
                    SERIAL NUMBER 5792 SOLD TO C.E.S.
                    RUN BEGAN ON 11-20-97 AT 15:15:10

1
                         *** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35                    ***

          CALCULATE (CONCENTRATION=1,DEPOSITION=2)                              ISW(1) =   1
          RECEPTOR GRID SYSTEM (RECTANGULAR=1 OR 3, POLAR=2 OR 4)               ISW(2) =   1
          DISCRETE RECEPTOR SYSTEM (RECTANGULAR=1,POLAR=2)                      ISW(3) =   1
          TERRAIN ELEVATIONS ARE READ (YES=1,NO=0)                              ISW(4) =   0
          CALCULATIONS ARE WRITTEN TO TAPE (YES=1,NO=0)                         ISW(5) =   0
          LIST ALL INPUT DATA (NO=0,YES=1,MET DATA ALSO=2)                      ISW(6) =   1

          COMPUTE AVERAGE CONCENTRATION (OR TOTAL DEPOSITION)
          WITH THE FOLLOWING TIME PERIODS:
            HOURLY (YES=1,NO=0)                                                 ISW(7) =   1
            2-HOUR (YES=1,NO=0)                                                 ISW(8) =   0
            3-HOUR (YES=1,NO=0)                                                 ISW(9) =   0
            4-HOUR (YES=1,NO=0)                                                ISW(10) =   0
            6-HOUR (YES=1,NO=0)                                                ISW(11) =   0
            8-HOUR (YES=1,NO=0)                                                ISW(12) =   0
            12-HOUR (YES=1,NO=0)                                               ISW(13) =   0
            24-HOUR (YES=1,NO=0)                                               ISW(14) =   1
          PRINT 'N'-DAY TABLE(S) (YES=1,NO=0)                                  ISW(15) =   1

          PRINT THE FOLLOWING TYPES OF TABLES WHOSE TIME PERIODS ARE
          SPECIFIED BY ISW(7) THROUGH ISW(14):
            DAILY TABLES (YES=1,NO=0)                                          ISW(16) =   0
            HIGHEST & SECOND HIGHEST TABLES (YES=1,NO=0)                       ISW(17) =   1
            MAXIMUM 50 TABLES (YES=1,NO=0)                                     ISW(18) =   0
          METEOROLOGICAL DATA INPUT METHOD (PRE-PROCESSED=1,CARD=2)            ISW(19) =   1
          RURAL-URBAN OPTION (RU.=0,UR. MODE 1=1,UR. MODE 2=2,UR. MODE 3=3)    ISW(20) =   3
          WIND PROFILE EXPONENT VALUES (DEFAULTS=1,USER ENTERS=2,3)            ISW(21) =   1
          VERTICAL POT. TEMP. GRADIENT VALUES (DEFAULTS=1,USER ENTERS=2,3)     ISW(22) =   1
          SCALE EMISSION RATES FOR ALL SOURCES (NO=0,YES>0)                    ISW(23) =   0
          PROGRAM CALCULATES FINAL PLUME RISE ONLY (YES=1,NO=2)                ISW(24) =   2
          PROGRAM ADJUSTS ALL STACK HEIGHTS FOR DOWNWASH (YES=2,NO=1)          ISW(25) =   2
          PROGRAM USES BUOYANCY INDUCED DISPERSION (YES=1,NO=2)                ISW(26) =   1
          CONCENTRATIONS DURING CALM PERIODS SET = 0 (YES=1,NO=2)              ISW(27) =   1
          REG. DEFAULT OPTION CHOSEN (YES=1,NO=2)                              ISW(28) =   2
          TYPE OF POLLUTANT TO BE MODELLED (1=SO2,2=OTHER)                     ISW(29) =   1
          DEBUG OPTION CHOSEN (YES=1,NO=2)                                     ISW(30) =   2
          ABOVE GROUND (FLAGPOLE) RECEPTORS USED (YES=1,NO=0)                  ISW(31) =   1

          NUMBER OF INPUT SOURCES                                              NSOURC =  76
          NUMBER OF SOURCE GROUPS (=0,ALL SOURCES)                             NGROUP =   0
          TIME PERIOD INTERVAL TO BE PRINTED (=0,ALL INTERVALS)                 IPERD =   0
          NUMBER OF X (RANGE) GRID VALUES                                      NXPNTS =   0
          NUMBER OF Y (THETA) GRID VALUES                                      NYPNTS =   0
          NUMBER OF DISCRETE RECEPTORS                                         NXWYPT =   1
          SOURCE EMISSION RATE UNITS CONVERSION FACTOR                             TK =.10000E+07
          HEIGHT ABOVE GROUND AT WHICH WIND SPEED WAS MEASURED                     ZR =   65.00  METERS
          LOGICAL UNIT NUMBER OF METEOROLOGICAL DATA                             IMET =   9
          DECAY COEFFICIENT FOR PHYSICAL OR CHEMICAL DEPLETION                  DECAY = .000000E+00
          SURFACE STATION NO.                                                     ISS = 99999
          YEAR OF SURFACE DATA                                                    ISY = 93
          UPPER AIR STATION NO.                                                   IUS = 99999
          YEAR OF UPPER AIR DATA                                                  IUY = 93
          ALLOCATED DATA STORAGE                                                LIMIT = 43500 WORDS
          REQUIRED DATA STORAGE FOR THIS PROBLEM RUN                            MIMIT = 21828 WORDS
1
                         *** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35                    ***

                              *** METEOROLOGICAL DAYS TO BE PROCESSED ***
                                              (IF=1)

   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1

                      *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                           (METERS/SEC)

                                 1.54,   3.09,   5.14,   8.23,  10.80,

                                     *** WIND PROFILE EXPONENTS ***

            STABILITY                            WIND SPEED CATEGORY
```

\b010\model\new_chim\twbr18.lst

# Table B3.2

## Sample ISCST Output File (ASR 18 - 1st Floor)

| CATEGORY | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| A | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 |
| B | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 | .15000E+00 |
| C | .20000E+00 | .20000E+00 | .20000E+00 | .20000E+00 | .20000E+00 | .20000E+00 |
| D | .25000E+00 | .25000E+00 | .25000E+00 | .25000E+00 | .25000E+00 | .25000E+00 |
| E | .30000E+00 | .30000E+00 | .30000E+00 | .30000E+00 | .30000E+00 | .30000E+00 |
| F | .30000E+00 | .30000E+00 | .30000E+00 | .30000E+00 | .30000E+00 | .30000E+00 |

*** VERTICAL POTENTIAL TEMPERATURE GRADIENTS ***
(DEGREES KELVIN PER METER)

| STABILITY CATEGORY | WIND SPEED CATEGORY 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| A | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 |
| B | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 |
| C | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 |
| D | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 | .00000E+00 |
| E | .20000E-01 | .20000E-01 | .20000E-01 | .20000E-01 | .20000E-01 | .20000E-01 |
| F | .35000E-01 | .35000E-01 | .35000E-01 | .35000E-01 | .35000E-01 | .35000E-01 |

*** X,Y COORDINATES OF DISCRETE RECEPTORS ***
(METERS)

( 828744.9, 825839.8), (

1

*** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35 ***

* ABOVE GROUND RECEPTOR HEIGHTS IN METERS *
* FOR THE DISCRETE RECEPTOR POINTS *

| - X - | - Y - | HGT. | - X - | - Y - | HGT. | - X - | - Y - | HGT. |
|---|---|---|---|---|---|---|---|---|
| 828744.9 | 825839.8 | 25.80000 | | | | | | |

1

*** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35 ***

*** SOURCE DATA ***

| SOURCE NUMBER | TYPE | WAKE | NUMBER PART. CATS. | EMISSION RATE TYPE=0,1 (GRAMS/SEC) TYPE=2 (GRAMS/SEC) *PER METER**2 | X (METERS) | Y (METERS) | BASE ELEV. (METERS) | HEIGHT (METERS) | TEMP. TYPE=0 (DEG.K); VERT.DIM TYPE=1 (METERS) | EXIT VEL. TYPE=0 (M/SEC); HORZ.DIM TYPE=1,2 (METERS) | DIAMETER TYPE=0 (METERS) | BLDG. HEIGHT TYPE=0 (METERS) | BLDG. LENGTH TYPE=0 (METERS) | BLDG. WIDTH TYPE=0 (METERS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | .95100E+00 | 828777.0 | 825980.0 | .0 | 114.00 | 422.00 | 7.50 | .61 | .00 | .00 | .00 |
| 2 | 0 | 0 | 0 | .21769E+01 | 828774.0 | 825980.0 | .0 | 108.10 | 395.15 | 7.56 | .55 | .00 | .00 | .00 |
| 3 | 0 | 0 | 0 | .17708E+00 | 828816.0 | 825982.0 | .0 | 114.70 | 403.15 | 6.00 | .62 | .00 | .00 | .00 |
| 4 | 0 | 0 | 0 | .29514E+00 | 828835.0 | 825996.0 | .0 | 112.00 | 416.15 | 6.00 | .43 | .00 | .00 | .00 |
| 5 | 0 | 0 | 0 | .11097E+01 | 828780.0 | 826003.0 | .0 | 115.00 | 415.15 | 7.50 | .66 | .00 | .00 | .00 |
| 6 | 0 | 0 | 0 | .54683E+00 | 828801.0 | 826011.0 | .0 | 114.90 | 429.15 | 7.50 | .54 | .00 | .00 | .00 |
| 7 | 0 | 0 | 0 | .43287E+00 | 828767.0 | 826015.0 | .0 | 91.50 | 412.15 | 6.00 | .60 | .00 | .00 | .00 |
| 8 | 0 | 0 | 0 | .10330E+01 | 828764.0 | 826015.0 | .0 | 109.00 | 412.15 | 7.50 | .75 | .00 | .00 | .00 |
| 9 | 0 | 0 | 0 | .32465E+00 | 828778.0 | 826026.0 | .0 | 114.00 | 422.00 | 6.00 | .61 | .00 | .00 | .00 |
| 10 | 0 | 0 | 0 | .27546E+00 | 828805.0 | 826035.0 | .0 | 90.00 | 473.15 | 6.00 | .46 | .00 | .00 | .00 |
| 11 | 0 | 0 | 0 | .15741E+00 | 828756.0 | 826033.0 | .0 | 102.00 | 422.00 | 6.00 | .22 | .00 | .00 | .00 |
| 12 | 0 | 0 | 0 | .39352E+00 | 828945.0 | 826047.0 | .0 | 74.50 | 422.15 | 6.00 | .56 | .00 | .00 | .00 |
| 13 | 0 | 0 | 0 | .97701E+00 | 828964.0 | 826036.0 | .0 | 102.70 | 466.15 | 7.50 | .56 | .00 | .00 | .00 |
| 14 | 0 | 0 | 0 | .19676E+00 | 828940.0 | 826051.0 | .0 | 72.10 | 427.15 | 6.00 | .38 | .00 | .00 | .00 |
| 15 | 0 | 0 | 0 | .10494E+00 | 829008.0 | 826044.0 | .0 | 62.80 | 416.15 | 6.00 | .32 | .00 | .00 | .00 |
| 16 | 0 | 0 | 0 | .13773E+01 | 829005.0 | 826047.0 | .0 | 63.80 | 439.15 | 7.50 | .55 | .00 | .00 | .00 |
| 17 | 0 | 0 | 0 | .30694E+00 | 829004.0 | 826050.0 | .0 | 62.30 | 443.15 | 6.00 | .45 | .00 | .00 | .00 |
| 18 | 0 | 0 | 0 | .15025E+00 | 829025.0 | 826040.0 | .0 | 65.90 | 403.15 | 6.00 | .34 | .00 | .00 | .00 |
| 19 | 0 | 0 | 0 | .29514E+00 | 829038.0 | 826028.0 | .0 | 93.40 | 422.00 | 6.00 | .51 | .00 | .00 | .00 |
| 20 | 0 | 0 | 0 | .18889E+00 | 828996.0 | 826071.0 | .0 | 61.10 | 450.15 | 6.00 | .36 | .00 | .00 | .00 |
| 21 | 0 | 0 | 0 | .16528E+00 | 828997.0 | 826073.0 | .0 | 56.20 | 466.15 | 6.00 | .43 | .00 | .00 | .00 |
| 22 | 0 | 0 | 0 | .20988E+00 | 829042.0 | 826035.0 | .0 | 96.40 | 413.15 | 6.00 | .47 | .00 | .00 | .00 |
| 23 | 0 | 0 | 0 | .11806E+00 | 829013.0 | 826062.0 | .0 | 73.60 | 439.15 | 6.00 | .75 | .00 | .00 | .00 |
| 24 | 0 | 0 | 0 | .31482E+00 | 828968.0 | 826100.0 | .0 | 59.40 | 466.15 | 6.00 | .46 | .00 | .00 | .00 |
| 25 | 0 | 0 | 0 | .13184E+01 | 828970.0 | 826102.0 | .0 | 74.80 | 429.15 | 7.50 | .64 | .00 | .00 | .00 |
| 26 | 0 | 0 | 0 | .10266E+01 | 828970.0 | 826102.0 | .0 | 71.00 | 455.15 | 7.50 | .75 | .00 | .00 | .00 |
| 27 | 0 | 0 | 0 | .43287E+00 | 829049.0 | 826042.0 | .0 | 69.90 | 450.15 | 6.00 | .56 | .00 | .00 | .00 |
| 28 | 0 | 0 | 0 | .78704E-01 | 829011.0 | 826082.0 | .0 | 59.40 | 393.15 | 6.00 | .30 | .00 | .00 | .00 |
| 29 | 0 | 0 | 0 | .35417E-01 | 829101.0 | 826095.0 | .0 | 26.60 | 422.00 | 6.00 | .44 | .00 | .00 | .00 |
| 30 | 0 | 0 | 0 | .98380E+00 | 829217.0 | 825903.0 | .0 | 82.30 | 422.00 | 7.50 | .23 | .00 | .00 | .00 |
| 31 | 0 | 0 | 0 | .25047E+00 | 829038.0 | 826183.0 | .0 | 64.30 | 473.15 | 6.00 | .43 | .00 | .00 | .00 |
| 32 | 0 | 0 | 0 | .18692E+01 | 829060.0 | 826170.0 | .0 | 79.90 | 422.00 | 7.50 | .90 | .00 | .00 | .00 |
| 33 | 0 | 0 | 0 | .26563E+00 | 829031.0 | 826191.0 | .0 | 64.70 | 427.15 | 6.00 | .43 | .00 | .00 | .00 |
| 34 | 0 | 0 | 0 | .13409E+00 | 829184.0 | 826043.0 | .0 | 31.80 | 422.00 | 6.00 | .71 | .00 | .00 | .00 |
| 35 | 0 | 0 | 0 | .17708E+00 | 829067.0 | 826174.0 | .0 | 79.60 | 436.15 | 6.00 | .46 | .00 | .00 | .00 |

\b010\model\new_chim\twbr18.lst

# Table B3.2

## Sample ISCST Output File (ASR 18 - 1st Floor)

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36 | 0 | 0 | 0 | .13773E+01 | 829024.0 | 826205.0 | .0 | 72.30 | 422.15 | 7.50 | .63 | .00 | .00 | .00 |
| 37 | 0 | 0 | 0 | .29514E+00 | 829075.0 | 826195.0 | .0 | 67.80 | 422.15 | 6.00 | .41 | .00 | .00 | .00 |
| 38 | 0 | 0 | 0 | .28333E-01 | 829249.0 | 826011.0 | .0 | 102.00 | 423.15 | 6.00 | .16 | .00 | .00 | .00 |
| 39 | 0 | 0 | 0 | .33333E-01 | 829290.0 | 825964.0 | .0 | 91.60 | 453.15 | 6.00 | .26 | .00 | .00 | .00 |

1

*** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35 ***

*** SOURCE DATA ***

| SOURCE NUMBER | TYPE | WAKE | NUMBER PART. CATS. | EMISSION RATE TYPE=0,1 (GRAMS/SEC) TYPE=2 (GRAMS/SEC) *PER METER**2 | X (METERS) | Y (METERS) | BASE ELEV. (METERS) | HEIGHT (METERS) | TEMP. TYPE=0 (DEG.K); VERT.DIM TYPE=1 (METERS) | EXIT VEL. TYPE=0 (M/SEC); HORZ.DIM TYPE=1,2 (METERS) | DIAMETER TYPE=0 (METERS) | BLDG. HEIGHT TYPE=0 (METERS) | BLDG. LENGTH TYPE=0 (METERS) | BLDG. WIDTH TYPE=0 (METERS) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 40 | 0 | 0 | 0 | .29514E-01 | 829256.0 | 826052.0 | .0 | 93.30 | 422.00 | 6.00 | .27 | .00 | .00 | .00 |
| 41 | 0 | 0 | 0 | .78704E-01 | 829291.0 | 826011.0 | .0 | 98.50 | 422.00 | 6.00 | .36 | .00 | .00 | .00 |
| 42 | 0 | 0 | 0 | .39667E+00 | 829365.0 | 825944.0 | .0 | 111.60 | 422.00 | 6.00 | .48 | .00 | .00 | .00 |
| 43 | 0 | 0 | 0 | .52469E-01 | 829367.0 | 825975.0 | .0 | 109.80 | 422.00 | 6.00 | .25 | .00 | .00 | .00 |
| 44 | 0 | 0 | 0 | .88889E-01 | 829307.0 | 826112.0 | .0 | 45.10 | 422.00 | 6.00 | .38 | .00 | .00 | .00 |
| 45 | 0 | 0 | 0 | .38958E+00 | 829309.0 | 826111.0 | .0 | 45.10 | 422.00 | 6.00 | .38 | .00 | .00 | .00 |
| 46 | 0 | 0 | 0 | .32760E-01 | 828858.0 | 826394.0 | .0 | 19.10 | 432.15 | 6.00 | .18 | .00 | .00 | .00 |
| 47 | 0 | 0 | 0 | .40321E-01 | 828857.0 | 826396.0 | .0 | 23.20 | 505.15 | 6.00 | .20 | .00 | .00 | .00 |
| 48 | 0 | 0 | 0 | .28333E-01 | 829396.0 | 826083.0 | .0 | 93.50 | 422.00 | 6.00 | .25 | .00 | .00 | .00 |
| 49 | 0 | 0 | 0 | .12986E+00 | 829407.0 | 826099.0 | .0 | 97.80 | 466.15 | 6.00 | .30 | .00 | .00 | .00 |
| 50 | 0 | 0 | 0 | .36318E+00 | 829409.0 | 826099.0 | .0 | 115.80 | 430.15 | 6.00 | .38 | .00 | .00 | .00 |
| 51 | 0 | 0 | 0 | .14167E-01 | 829505.0 | 825986.0 | .0 | 24.40 | 422.00 | 6.00 | .25 | .00 | .00 | .00 |
| 52 | 0 | 0 | 0 | .11806E+00 | 829606.0 | 825841.0 | .0 | 75.30 | 422.00 | 6.00 | .30 | .00 | .00 | .00 |
| 53 | 0 | 0 | 0 | .22109E-01 | 829603.0 | 825921.0 | .0 | 24.40 | 422.00 | 6.00 | .25 | .00 | .00 | .00 |
| 54 | 0 | 0 | 0 | .80950E-02 | 829800.0 | 825633.0 | .0 | 22.90 | 422.00 | 6.00 | .25 | .00 | .00 | .00 |
| 55 | 0 | 0 | 0 | .10794E-01 | 829809.0 | 825627.0 | .0 | 24.40 | 422.00 | 6.00 | .25 | .00 | .00 | .00 |
| 56 | 0 | 0 | 0 | .29514E-01 | 829850.0 | 825600.0 | .0 | 11.00 | 422.00 | 6.00 | .22 | .00 | .00 | .00 |
| 57 | 0 | 0 | 0 | .15741E-01 | 829881.0 | 825581.0 | .0 | 15.50 | 422.00 | 6.00 | .30 | .00 | .00 | .00 |
| 58 | 0 | 0 | 0 | .23611E-01 | 829893.0 | 825578.0 | .0 | 15.20 | 422.00 | 6.00 | .25 | .00 | .00 | .00 |
| 59 | 0 | 0 | 0 | .14757E-01 | 829903.0 | 825572.0 | .0 | 15.20 | 422.00 | 6.00 | .20 | .00 | .00 | .00 |
| 60 | 0 | 0 | 0 | .31481E-01 | 829981.0 | 825502.0 | .0 | 22.00 | 463.15 | 6.00 | .22 | .00 | .00 | .00 |
| 61 | 0 | 0 | 0 | .21250E-01 | 830022.0 | 825783.0 | .0 | 25.90 | 422.00 | 6.00 | .25 | .00 | .00 | .00 |
| 62 | 0 | 0 | 0 | .19676E-01 | 830010.0 | 825552.0 | .0 | 21.90 | 422.00 | 6.00 | .22 | .00 | .00 | .00 |
| 63 | 0 | 0 | 0 | .11806E+00 | 829913.0 | 825212.0 | .0 | 79.20 | 436.15 | 6.00 | .40 | .00 | .00 | .00 |
| 64 | 0 | 0 | 0 | .41074E+00 | 829987.0 | 825261.0 | .0 | 65.20 | 453.15 | 6.00 | .76 | .00 | .00 | .00 |
| 65 | 0 | 0 | 0 | .23611E+00 | 829993.0 | 825242.0 | .0 | 61.30 | 422.00 | 6.00 | .25 | .00 | .00 | .00 |
| 66 | 0 | 0 | 0 | .13756E-01 | 830102.0 | 825572.0 | .0 | 27.40 | 422.00 | 6.00 | .31 | .00 | .00 | .00 |
| 67 | 0 | 0 | 0 | .52469E-01 | 829964.0 | 825161.0 | .0 | 35.10 | 422.00 | 6.00 | .30 | .00 | .00 | .00 |
| 68 | 0 | 0 | 0 | .12935E+00 | 830129.0 | 825739.0 | .0 | 67.60 | 427.15 | 6.00 | .38 | .00 | .00 | .00 |
| 69 | 0 | 0 | 0 | .27083E-01 | 830163.0 | 825833.0 | .0 | 27.40 | 422.00 | 6.00 | .30 | .00 | .00 | .00 |
| 70 | 0 | 0 | 0 | .22222E-01 | 829927.0 | 824982.0 | .0 | 107.50 | 422.00 | 6.00 | .31 | .00 | .00 | .00 |
| 71 | 0 | 0 | 0 | .14167E-01 | 829932.0 | 824954.0 | .0 | 102.90 | 422.00 | 6.00 | .27 | .00 | .00 | .00 |
| 72 | 0 | 0 | 0 | .13582E+00 | 830238.0 | 825848.0 | .0 | 78.90 | 422.00 | 6.00 | .38 | .00 | .00 | .00 |
| 73 | 0 | 0 | 0 | .14757E+00 | 830222.0 | 825564.0 | .0 | 49.20 | 429.15 | 6.00 | .35 | .00 | .00 | .00 |
| 74 | 0 | 0 | 0 | .35133E+00 | 830066.0 | 825063.0 | .0 | 100.30 | 422.00 | 6.00 | .64 | .00 | .00 | .00 |
| 75 | 0 | 0 | 0 | .10176E+01 | 830091.0 | 825058.0 | .0 | 76.80 | 422.00 | 7.50 | .78 | .00 | .00 | .00 |
| 76 | 0 | 0 | 0 | .34343E+00 | 830135.0 | 826460.0 | .0 | 8.50 | 422.00 | 6.00 | .41 | .00 | .00 | .00 |

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*** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35 ***

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

| HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SOURCE NO. = 1 | | | | | | | | | | | |
| 1 | .10000E+01 | 2 | .10000E+01 | 3 | .10000E+01 | 4 | .10000E+01 | 5 | .10000E+01 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .10000E+01 |
| SOURCE NO. = 2 | | | | | | | | | | | |
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .00000E+00 | 11 | .00000E+00 | 12 | .00000E+00 |
| 13 | .00000E+00 | 14 | .00000E+00 | 15 | .00000E+00 | 16 | .00000E+00 | 17 | .00000E+00 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |
| SOURCE NO. = 3 | | | | | | | | | | | |
| 1 | .10000E+01 | 2 | .10000E+01 | 3 | .10000E+01 | 4 | .10000E+01 | 5 | .10000E+01 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .10000E+01 |
| SOURCE NO. = 4 | | | | | | | | | | | |
| 1 | .10000E+01 | 2 | .10000E+01 | 3 | .10000E+01 | 4 | .10000E+01 | 5 | .10000E+01 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |

# Table B3.2
## Sample ISCST Output File (ASR 18 - 1st Floor)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .10000E+01 |
| SOURCE NO. = 5 | | | | | | | | | | | |
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .00000E+00 | 11 | .00000E+00 | 12 | .00000E+00 |
| 13 | .00000E+00 | 14 | .00000E+00 | 15 | .00000E+00 | 16 | .00000E+00 | 17 | .00000E+00 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |
| SOURCE NO. = 6 | | | | | | | | | | | |
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .00000E+00 | 11 | .00000E+00 | 12 | .00000E+00 |
| 13 | .00000E+00 | 14 | .00000E+00 | 15 | .00000E+00 | 16 | .00000E+00 | 17 | .00000E+00 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

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*** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35 ***

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

| HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SOURCE NO. = 7 | | | | | | | | | | | |
| 1 | .10000E+01 | 2 | .10000E+01 | 3 | .10000E+01 | 4 | .10000E+01 | 5 | .10000E+01 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .10000E+01 |
| SOURCE NO. = 8 | | | | | | | | | | | |
| 1 | .10000E+01 | 2 | .10000E+01 | 3 | .10000E+01 | 4 | .10000E+01 | 5 | .10000E+01 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .10000E+01 |
| SOURCE NO. = 9 | | | | | | | | | | | |
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .00000E+00 |
| SOURCE NO. = 10 | | | | | | | | | | | |
| 1 | .10000E+01 | 2 | .10000E+01 | 3 | .10000E+01 | 4 | .10000E+01 | 5 | .10000E+01 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .10000E+01 |
| SOURCE NO. = 11 | | | | | | | | | | | |
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .10000E+01 | 11 | .50000E+00 | 12 | .00000E+00 |
| 13 | .00000E+00 | 14 | .00000E+00 | 15 | .00000E+00 | 16 | .00000E+00 | 17 | .00000E+00 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |
| SOURCE NO. = 12 | | | | | | | | | | | |
| 1 | .10000E+01 | 2 | .10000E+01 | 3 | .10000E+01 | 4 | .10000E+01 | 5 | .10000E+01 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .10000E+01 |

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*** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35 ***

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

| HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SOURCE NO. = 13 | | | | | | | | | | | |
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .50000E+00 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .00000E+00 | 24 | .00000E+00 |
| SOURCE NO. = 14 | | | | | | | | | | | |
| 1 | .10000E+01 | 2 | .10000E+01 | 3 | .10000E+01 | 4 | .10000E+01 | 5 | .10000E+01 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |

# Table B3.2
## Sample ISCST Output File (ASR 18 - 1st Floor)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .10000E+01 |

SOURCE NO. = 15

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .10000E+01 | 2 | .10000E+01 | 3 | .10000E+01 | 4 | .10000E+01 | 5 | .10000E+01 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 16

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 17

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 18

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E-01 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

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*** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35 ***

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

| HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR |
|---|---|---|---|---|---|---|---|---|---|---|---|

SOURCE NO. = 19

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .10000E+01 | 2 | .10000E+01 | 3 | .10000E+01 | 4 | .10000E+01 | 5 | .10000E+01 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E-01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .10000E+01 |

SOURCE NO. = 20

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .00000E+00 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .00000E+00 | 14 | .00000E+00 | 15 | .00000E+00 | 16 | .00000E+00 | 17 | .00000E+00 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 21

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 22

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .50000E+00 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .50000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 23

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .10000E+01 | 2 | .10000E+01 | 3 | .10000E+01 | 4 | .10000E+01 | 5 | .10000E+01 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .10000E+01 |

SOURCE NO. = 24

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

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*** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35 ***

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

| HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR |
|---|---|---|---|---|---|---|---|---|---|---|---|

Table B3.2
Sample ISCST Output File (ASR 18 - 1st Floor)

- -

SOURCE NO. = 25

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .00000E+00 | 11 | .00000E+00 | 12 | .00000E+00 |
| 13 | .00000E+00 | 14 | .00000E+00 | 15 | .00000E+00 | 16 | .00000E+00 | 17 | .00000E+00 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 26

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .50000E+00 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 27

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 28

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 29

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .00000E+00 | 17 | .00000E+00 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 30

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .10000E+01 | 2 | .10000E+01 | 3 | .10000E+01 | 4 | .10000E+01 | 5 | .10000E+01 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .10000E+01 |

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*** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35 ***

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

| HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR |
|---|---|---|---|---|---|---|---|---|---|---|---|

- -

SOURCE NO. = 31

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 32

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .10000E+01 | 2 | .10000E+01 | 3 | .10000E+01 | 4 | .10000E+01 | 5 | .10000E+01 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .10000E+01 |

SOURCE NO. = 33

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 34

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .10000E+01 | 2 | .10000E+01 | 3 | .10000E+01 | 4 | .10000E+01 | 5 | .10000E+01 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .10000E+01 |

SOURCE NO. = 35

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .10000E+01 | 2 | .10000E+01 | 3 | .10000E+01 | 4 | .10000E+01 | 5 | .10000E+01 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .10000E+01 |

# Table B3.2

## Sample ISCST Output File (ASR 18 - 1st Floor)

SOURCE NO. = 36

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .10000E+01 | 2 | .10000E+01 | 3 | .10000E+01 | 4 | .10000E+01 | 5 | .10000E+01 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .10000E+01 |

1

*** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35 ***

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

| HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR |
|---|---|---|---|---|---|---|---|---|---|---|---|

SOURCE NO. = 37

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .10000E+01 | 2 | .10000E+01 | 3 | .10000E+01 | 4 | .10000E+01 | 5 | .10000E+01 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .10000E+01 |

SOURCE NO. = 38

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 39

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .50000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 40

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .00000E+00 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 41

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 42

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

1

*** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35 ***

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

| HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR |
|---|---|---|---|---|---|---|---|---|---|---|---|

SOURCE NO. = 43

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .10000E+01 | 2 | .10000E+01 | 3 | .10000E+01 | 4 | .10000E+01 | 5 | .10000E+01 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 44

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .50000E+00 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 45

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .50000E+00 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

# Table B3.2
## Sample ISCST Output File (ASR 18 - 1st Floor)

SOURCE NO. = 46

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .10000E+01 | 2 | .10000E+01 | 3 | .10000E+01 | 4 | .10000E+01 | 5 | .10000E+01 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .10000E+01 |

SOURCE NO. = 47

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .50000E+00 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .10000E+01 |

SOURCE NO. = 48

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .00000E+00 | 11 | .00000E+00 | 12 | .00000E+00 |
| 13 | .00000E+00 | 14 | .00000E+00 | 15 | .00000E+00 | 16 | .00000E+00 | 17 | .00000E+00 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

1

*** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35 ***

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

| HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR |
|---|---|---|---|---|---|---|---|---|---|---|---|

SOURCE NO. = 49

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .00000E+00 | 11 | .00000E+00 | 12 | .00000E+00 |
| 13 | .00000E+00 | 14 | .00000E+00 | 15 | .00000E+00 | 16 | .00000E+00 | 17 | .00000E+00 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 50

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 51

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .00000E+00 | 11 | .00000E+00 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .00000E+00 | 16 | .00000E+00 | 17 | .00000E+00 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 52

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .50000E+00 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .50000E+00 |

SOURCE NO. = 53

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .00000E+00 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 54

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .50000E+00 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .00000E+00 | 24 | .00000E+00 |

1

*** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35 ***

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

| HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR |
|---|---|---|---|---|---|---|---|---|---|---|---|

SOURCE NO. = 55

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .50000E+00 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .00000E+00 | 24 | .00000E+00 |

# Table B3.2
## Sample ISCST Output File (ASR 18 - 1st Floor)

SOURCE NO. = 56

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 57

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .00000E+00 | 15 | .00000E+00 | 16 | .00000E+00 | 17 | .00000E+00 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 58

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .00000E+00 | 11 | .00000E+00 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 59

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 60

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .00000E+00 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .50000E+00 |

1

*** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35 ***

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

| HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR |
|---|---|---|---|---|---|---|---|---|---|---|---|

SOURCE NO. = 61

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .00000E+00 | 11 | .00000E+00 | 12 | .00000E+00 |
| 13 | .00000E+00 | 14 | .00000E+00 | 15 | .00000E+00 | 16 | .00000E+00 | 17 | .00000E+00 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 62

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .00000E+00 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 63

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .00000E+00 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 64

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .10000E+01 | 2 | .10000E+01 | 3 | .10000E+01 | 4 | .10000E+01 | 5 | .10000E+01 | 6 | .10000E+01 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .10000E+01 |

SOURCE NO. = 65

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .00000E+00 | 11 | .50000E+00 | 12 | .00000E+00 |
| 13 | .00000E+00 | 14 | .00000E+00 | 15 | .00000E+00 | 16 | .00000E+00 | 17 | .00000E+00 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

SOURCE NO. = 66

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .00000E+00 | 11 | .00000E+00 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .50000E+00 | 24 | .00000E+00 |

1

*** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35 ***

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

# Table B3.2
## Sample ISCST Output File (ASR 18 - 1st Floor)

| HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SOURCE NO. = 67 | | | | | | | | | | | |
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |
| SOURCE NO. = 68 | | | | | | | | | | | |
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .00000E+00 | 11 | .00000E+00 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .50000E+00 | 24 | .00000E+00 |
| SOURCE NO. = 69 | | | | | | | | | | | |
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .00000E+00 | 18 | .00000E+00 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |
| SOURCE NO. = 70 | | | | | | | | | | | |
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .50000E+00 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .00000E+00 | 20 | .00000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |
| SOURCE NO. = 71 | | | | | | | | | | | |
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .00000E+00 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |
| SOURCE NO. = 72 | | | | | | | | | | | |
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .10000E+01 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .00000E+00 | 24 | .00000E+00 |

1

*** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35 ***

* SOURCE EMISSION RATE SCALARS WHICH VARY FOR EACH HOUR OF THE DAY *

| HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR | HOUR | SCALAR |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SOURCE NO. = 73 | | | | | | | | | | | |
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .10000E+01 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .00000E+00 |
| SOURCE NO. = 74 | | | | | | | | | | | |
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .00000E+00 |
| SOURCE NO. = 75 | | | | | | | | | | | |
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .10000E+01 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .10000E+01 | 21 | .10000E+01 | 22 | .10000E+01 | 23 | .10000E+01 | 24 | .10000E+01 |
| SOURCE NO. = 76 | | | | | | | | | | | |
| 1 | .00000E+00 | 2 | .00000E+00 | 3 | .00000E+00 | 4 | .00000E+00 | 5 | .00000E+00 | 6 | .00000E+00 |
| 7 | .00000E+00 | 8 | .00000E+00 | 9 | .50000E+00 | 10 | .10000E+01 | 11 | .10000E+01 | 12 | .10000E+01 |
| 13 | .10000E+01 | 14 | .10000E+01 | 15 | .10000E+01 | 16 | .10000E+01 | 17 | .10000E+01 | 18 | .10000E+01 |
| 19 | .10000E+01 | 20 | .50000E+00 | 21 | .00000E+00 | 22 | .00000E+00 | 23 | .00000E+00 | 24 | .00000E+00 |

```
* CALM HOURS (=1) FOR DAY  28 *  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0
* CALM HOURS (=1) FOR DAY  31 *  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0
* CALM HOURS (=1) FOR DAY  35 *  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0
* CALM HOURS (=1) FOR DAY  40 *  0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
* CALM HOURS (=1) FOR DAY  46 *  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1
```

# Table B3.2
## Sample ISCST Output File (ASR 18 - 1st Floor)

```
 * CALM HOURS (=1) FOR DAY  52 *  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  1  0
 * CALM HOURS (=1) FOR DAY  58 *  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  0  0  0  0
 * CALM HOURS (=1) FOR DAY 135 *  0  0  0  0  0  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 * CALM HOURS (=1) FOR DAY 143 *  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 * CALM HOURS (=1) FOR DAY 146 *  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 * CALM HOURS (=1) FOR DAY 173 *  0  0  0  0  0  0  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1
 * CALM HOURS (=1) FOR DAY 217 *  0  0  0  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 * CALM HOURS (=1) FOR DAY 227 *  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 * CALM HOURS (=1) FOR DAY 228 *  0  0  0  0  0  0  0  0  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 * CALM HOURS (=1) FOR DAY 238 *  0  0  0  0  0  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 * CALM HOURS (=1) FOR DAY 357 *  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  0  0  0  0  0
 * CALM HOURS (=1) FOR DAY 360 *  1  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
1
                                                                                                   'N'-DAY
DAYS                                                                                                   365

1                                                                                                  SGROUP#
                               *** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35                  ***

                                 * 365-DAY AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)       *

                                              * FROM ALL SOURCES *
                                         * FOR THE DISCRETE RECEPTOR POINTS *

   - X -      - Y -         CON.          - X -      - Y -         CON.          - X -      - Y -         CON.
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
-

  828744.9   825839.8      3.30988
1
                                                                                                      HIGH
                                                                                                      1-HR
1                                                                                                  SGROUP#
                               *** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35                  ***

                              * HIGHEST  1-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)       *
                                              * FROM ALL SOURCES *
                                         * FOR THE DISCRETE RECEPTOR POINTS *

             - X -      - Y -        CON.      (DAY,HOUR)           - X -      - Y -        CON.      (DAY,HOUR)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
-

            828744.9   825839.8    157.07830  ( 34,17)
1
HIGH                                                                                                   2ND

                                                                                                      1-HR
1                                                                                                  SGROUP#
                               *** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35                  ***

                           * SECOND HIGHEST  1-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)       *
                                              * FROM ALL SOURCES *
                                         * FOR THE DISCRETE RECEPTOR POINTS *

             - X -      - Y -        CON.      (DAY,HOUR)           - X -      - Y -        CON.      (DAY,HOUR)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
-

            828744.9   825839.8    142.06770  ( 76,14)
1
                                                                                                      HIGH
                                                                                                     24-HR
1                                                                                                  SGROUP#
                               *** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35                  ***

                              * HIGHEST 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)       *
                                              * FROM ALL SOURCES *
                                         * FOR THE DISCRETE RECEPTOR POINTS *

             - X -      - Y -        CON.      (DAY,PER.)           - X -      - Y -        CON.      (DAY,PER.)
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
-

            828744.9   825839.8     22.78041  (291, 1)
1
HIGH                                                                                                   2ND

                                                                                                     24-HR
1                                                                                                  SGROUP#
                               *** TSUEN WAN BAY FURTHER RECLAMATION, AREA 35                  ***

                           * SECOND HIGHEST 24-HOUR AVERAGE CONCENTRATION (MICROGRAMS/CUBIC METER)       *
                                              * FROM ALL SOURCES *
                                         * FOR THE DISCRETE RECEPTOR POINTS *
```

Table B3.2
Sample ISCST Output File (ASR 18 - 1st Floor)

| - X - | - Y - | CON. | (DAY,PER.) | - X - | - Y - | CON. | (DAY,PER.) |
|---|---|---|---|---|---|---|---|
| 828744.9 | 825839.8 | 19.81695 | (288, 1) | | | | |

RUN ENDED ON 11-20-97 AT 15:16:06

**APPENDIX B4**

**AIR QUALITY ASSESSMENT RESULTS (OPERATIONAL PHASE)**

The following four attachments are attached to this Appendix B4:

(i) Table B4.1 Traffic Emission Assessment: Predicted Worst-case 1-hour Average $NO_2$ Concentrations at the Representative ASRs ($\mu g\ m^{-3}$)

(ii) Table B4.2 Predicted 1-hour Average $SO_2$ Concentrations at the ASRs ($\mu g\ m^{-3}$)

(iii) Table B4.3 Predicted 24-hour Average $SO_2$ Concentrations at the ASRs ($\mu g\ m^{-3}$)

(iv) Table B4.4 Predicted Annual Average $SO_2$ Concentrations at the ASRs ($\mu g\ m^{-3}$)

Table B4.1 Traffic Emission Impact Assessment:
Predicted Worst-case 1-hour Average $NO_2$ Concentrations at the Representative ASRs ($\mu g\ m^{-3}$)

| ASR | Emissions from Portals and Shafts not included | | Emissions from Portals and Shafts included [1] | |
|---|---|---|---|---|
| | 1.5 m above Ground | 1st Floor | 1.5 m above Ground | 1st Floor |
| 1 | 131 | 108 | 141 | 112 |
| 2 | 115 | 105 | 120 | 108 |
| 3 | 113 | 102 | 117 | 105 |
| 4 | 121 | 104 | 124 | 108 |
| 5 | 131 | 109 | 134 | 113 |
| 6 | 118 | 101 | 119 | 104 |
| 7 | 119 | 100 | 120 | 105 |
| 8 | 141 | 98 | 143 | 107 |
| 9 | 144 | 99 | 145 | 107 |
| 10 | 146 | 100 | 147 | 106 |
| 11 | 141 | 100 | 149 | 108 |
| 12 | 118 | 100 | 118 | 100 |
| 13 | 135 | 101 | 135 | 101 |
| 14 | 104 | 93 | 106 | 94 |
| 15 | 99 | 97 | 100 | 98 |
| 16 | 105 | 101 | 106 | 102 |
| 17 | 115 | 110 | 115 | 110 |
| 18 | 111 | 101 | 111 | 102 |
| 19 | 192 | 129 | 192 | 129 |
| 20 | 115 | 102 | 115 | 102 |
| 21 | 123 | 103 | 123 | 103 |
| 22 | 124 | 104 | 124 | 104 |
| 23 | 137 | 106 | 137 | 106 |
| 24 | 117 | 95 | 117 | 95 |
| 25 | 100 | 90 | 102 | 90 |
| 26 | 96 | 88 | 98 | 89 |
| 27 | 122 | 96 | 123 | 96 |
| 28 | 106 | 90 | 110 | 92 |
| 29 | 103 | 88 | 105 | 92 |
| 30 | 93 | 92 | 94 | 93 |
| 31 | 95 | 91 | 96 | 92 |
| 32 | 110 | 104 | 114 | 109 |
| 33 | 125 | 112 | 129 | 116 |
| 34 | 172 | 154 | 172 | 154 |
| 35 | 121 | 116 | 131 | 120 |
| 36 | 110 | 107 | 116 | 112 |
| 37 | 110 | 107 | 115 | 112 |
| 38 | 107 | 105 | 110 | 108 |
| 39 | 105 | 101 | 106 | 103 |
| 40 | 107 | 101 | 107 | 102 |
| 41 | 130 | 121 | 136 | 128 |
| 42 | 105 | 104 | 110 | 109 |
| 43 | 170 | 163 | 176 | 169 |
| 44 | 190 | 183 | 196 | 189 |
| 45 | 228 | 225 | 243 | 239 |
| 46 | 174 | 168 | 203 | 196 |
| 47 | 268 | 267 | 274 | 274 |

Background concentration of 60 $\mu g\ m^{-3}$ is included.

[1] For the traffic emission of the tunnel,
it is assumed that the emission from the portal and the ventilation shaft is 30% and 70% respectively.

Table B4.2 Predicted 1-hour Average $SO_2$ Concentrations at the ASRs ($\mu g\ m^{-3}$)

| ASR | 1st Floor | 7th Floor | 13th Foor | 19th Floor | 25th Floor | 31st Floor | 37th Floor |
|---|---|---|---|---|---|---|---|
| 1 | 106 | 106 | 126 | 170 | 211 | 239 | 245 |
| 2 | 103 | 104 | 132 | 182 | 232 | 266 | 276 |
| 3 | 99 | 101 | 135 | 192 | 250 | 293 | 308 |
| 4 | 108 | 109 | 136 | 200 | 264 | 314 | 331 |
| 5 | 115 | 117 | 135 | 203 | 271 | 322 | 339 |
| 6 | 133 | 135 | 138 | 225 | 334 | 440 | 501 |
| 7 | 138 | 142 | 147 | 223 | 341 | 464 | 544 |
| 8 | 143 | 149 | 157 | 259 | 373 | 463 | 503 |
| 9 | 145 | 153 | 165 | 264 | 390 | 490 | 548 |
| 10 | 145 | 155 | 171 | 267 | 405 | 514 | 594 |
| 11 | 146 | 154 | 173 | 267 | 421 | 533 | 641 |
| 12 | 150 | 164 | 199 | 286 | 401 | 432 | 420 |
| 13 | 127 | 143 | 174 | 287 | 444 | 523 | 482 |
| 14 | 132 | 135 | 139 | 154 | 224 | 283 | 311 |
| 15 | 131 | 136 | 145 | 157 | 248 | 325 | 356 |
| 16 | 122 | 130 | 142 | 163 | 269 | 365 | 406 |
| 17 | 115 | 125 | 142 | 169 | 284 | 401 | 452 |
| 18 | 157 | 170 | 231 | 318 | 487 | 519 | 650 |
| 19 | 152 | 191 | 239 | 475 | 745 | 682 | 454 |
| 20 | 134 | 176 | 228 | 396 | 592 | 654 | 557 |
| 21 | 164 | 175 | 199 | 422 | 616 | 644 | 514 |
| 22 | 148 | 160 | 207 | 440 | 630 | 646 | 559 |
| 23 | 163 | 183 | 256 | 358 | 510 | 548 | 454 |
| 24 | 151 | 154 | 189 | 347 | 477 | 503 | 440 |
| 25 | 135 | 135 | 192 | 320 | 420 | 441 | 389 |
| 26 | 120 | 119 | 199 | 314 | 400 | 418 | 378 |
| 27 | 151 | 156 | 193 | 354 | 485 | 525 | 450 |
| 28 | 143 | 163 | 187 | 269 | 363 | 396 | 348 |
| 29 | 141 | 155 | 170 | 240 | 324 | 351 | 308 |
| 30 | 122 | 121 | 120 | 169 | 253 | 313 | 324 |
| 31 | 118 | 117 | 116 | 174 | 254 | 311 | 321 |
| 32 | 120 | 120 | 120 | 178 | 278 | 349 | 357 |
| 33 | 118 | 117 | 116 | 181 | 272 | 334 | 339 |
| 34 | 153 | 161 | 173 | 186 | 387 | 533 | 493 |
| 35 | 149 | 153 | 160 | 205 | 395 | 532 | 517 |
| 36 | 139 | 139 | 141 | 194 | 328 | 423 | 422 |
| 37 | 132 | 132 | 131 | 167 | 271 | 347 | 353 |
| 38 | 119 | 119 | 117 | 176 | 262 | 319 | 320 |
| 39 | 129 | - | - | - | - | - | - |
| 40 | 139 | - | - | - | - | - | - |
| 41 | 133 | - | - | - | - | - | - |
| 42 | 128 | - | - | - | - | - | - |

Table B4.3 Predicted 24-hour Average $SO_2$ Concentrations at the ASRs ($\mu g\ m^{-3}$)

| ASR | 1st Floor | 7th Floor | 13th Foor | 19th Floor | 25th Floor | 31st Floor | 37th Floor |
|---|---|---|---|---|---|---|---|
| 1 | 13 | 13 | 13 | 15 | 19 | 22 | 23 |
| 2 | 13 | 13 | 14 | 15 | 19 | 23 | 25 |
| 3 | 13 | 14 | 15 | 16 | 20 | 24 | 26 |
| 4 | 15 | 15 | 16 | 17 | 22 | 27 | 30 |
| 5 | 16 | 16 | 17 | 18 | 24 | 30 | 33 |
| 6 | 17 | 19 | 21 | 24 | 28 | 36 | 42 |
| 7 | 17 | 19 | 23 | 26 | 31 | 39 | 47 |
| 8 | 18 | 20 | 24 | 29 | 34 | 46 | 56 |
| 9 | 18 | 21 | 26 | 32 | 39 | 49 | 63 |
| 10 | 18 | 22 | 27 | 35 | 44 | 54 | 71 |
| 11 | 18 | 22 | 28 | 38 | 51 | 65 | 84 |
| 12 | 21 | 25 | 30 | 39 | 52 | 73 | 92 |
| 13 | 25 | 28 | 33 | 48 | 62 | 70 | 68 |
| 14 | 20 | 21 | 22 | 26 | 34 | 42 | 46 |
| 15 | 22 | 22 | 24 | 28 | 38 | 48 | 54 |
| 16 | 22 | 23 | 25 | 29 | 41 | 52 | 59 |
| 17 | 23 | 24 | 27 | 31 | 44 | 56 | 64 |
| 18 | 23 | 27 | 33 | 45 | 62 | 78 | 99 |
| 19 | 24 | 32 | 43 | 62 | 87 | 82 | 73 |
| 20 | 26 | 30 | 36 | 56 | 78 | 91 | 93 |
| 21 | 22 | 27 | 32 | 45 | 63 | 71 | 85 |
| 22 | 19 | 24 | 30 | 40 | 56 | 70 | 93 |
| 23 | 18 | 23 | 31 | 52 | 76 | 97 | 108 |
| 24 | 20 | 23 | 26 | 34 | 46 | 54 | 61 |
| 25 | 19 | 21 | 23 | 30 | 39 | 45 | 47 |
| 26 | 18 | 19 | 22 | 28 | 34 | 38 | 41 |
| 27 | 18 | 21 | 27 | 38 | 50 | 61 | 65 |
| 28 | 18 | 21 | 26 | 35 | 43 | 49 | 51 |
| 29 | 18 | 21 | 25 | 32 | 38 | 44 | 45 |
| 30 | 18 | 19 | 20 | 21 | 27 | 32 | 34 |
| 31 | 18 | 19 | 19 | 20 | 25 | 30 | 31 |
| 32 | 18 | 19 | 21 | 25 | 34 | 40 | 45 |
| 33 | 19 | 20 | 20 | 25 | 34 | 41 | 44 |
| 34 | 32 | 35 | 40 | 48 | 71 | 90 | 87 |
| 35 | 21 | 22 | 26 | 33 | 50 | 69 | 81 |
| 36 | 26 | 27 | 28 | 36 | 51 | 63 | 66 |
| 37 | 28 | 29 | 30 | 37 | 50 | 60 | 61 |
| 38 | 27 | 27 | 27 | 34 | 42 | 48 | 50 |
| 39 | 21 | - | - | - | - | - | - |
| 40 | 22 | - | - | - | - | - | - |
| 41 | 18 | - | - | - | - | - | - |
| 42 | 23 | - | - | - | - | - | - |

Table B4.4 Predicted Annual Average $SO_2$ Concentrations at the ASRs ($\mu g\ m^{-3}$)

| ASR | 1st Floor | 7th Floor | 13th Foor | 19th Floor | 25th Floor | 31st Floor | 37th Floor |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 |
| 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
| 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
| 4 | 2 | 2 | 3 | 3 | 3 | 4 | 4 |
| 5 | 2 | 2 | 3 | 3 | 4 | 4 | 4 |
| 6 | 3 | 3 | 4 | 4 | 5 | 6 | 6 |
| 7 | 3 | 3 | 4 | 5 | 5 | 6 | 7 |
| 8 | 3 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 3 | 3 | 4 | 6 | 7 | 9 | 10 |
| 10 | 3 | 4 | 5 | 6 | 8 | 10 | 12 |
| 11 | 3 | 4 | 5 | 7 | 9 | 13 | 15 |
| 12 | 3 | 4 | 5 | 7 | 8 | 10 | 11 |
| 13 | 3 | 4 | 5 | 7 | 8 | 10 | 11 |
| 14 | 2 | 2 | 3 | 3 | 4 | 4 | 5 |
| 15 | 2 | 3 | 3 | 4 | 4 | 5 | 6 |
| 16 | 2 | 3 | 3 | 4 | 5 | 6 | 7 |
| 17 | 3 | 3 | 3 | 4 | 6 | 7 | 8 |
| 18 | 3 | 4 | 6 | 8 | 11 | 15 | 18 |
| 19 | 4 | 5 | 8 | 12 | 17 | 17 | 15 |
| 20 | 3 | 4 | 5 | 8 | 10 | 13 | 15 |
| 21 | 3 | 4 | 5 | 8 | 11 | 14 | 16 |
| 22 | 3 | 4 | 5 | 8 | 11 | 14 | 16 |
| 23 | 3 | 4 | 6 | 9 | 12 | 14 | 14 |
| 24 | 3 | 3 | 5 | 6 | 8 | 10 | 11 |
| 25 | 3 | 3 | 4 | 5 | 7 | 8 | 8 |
| 26 | 2 | 3 | 4 | 5 | 6 | 7 | 7 |
| 27 | 3 | 4 | 5 | 7 | 9 | 11 | 12 |
| 28 | 3 | 4 | 5 | 6 | 8 | 9 | 10 |
| 29 | 3 | 3 | 4 | 6 | 7 | 8 | 8 |
| 30 | 2 | 2 | 3 | 3 | 4 | 5 | 6 |
| 31 | 2 | 2 | 3 | 3 | 4 | 5 | 5 |
| 32 | 3 | 3 | 4 | 5 | 6 | 7 | 8 |
| 33 | 3 | 3 | 4 | 5 | 6 | 7 | 8 |
| 34 | 4 | 4 | 5 | 8 | 12 | 15 | 15 |
| 35 | 3 | 4 | 5 | 6 | 9 | 12 | 13 |
| 36 | 3 | 4 | 4 | 6 | 8 | 10 | 11 |
| 37 | 3 | 4 | 4 | 6 | 8 | 9 | 10 |
| 38 | 3 | 3 | 4 | 5 | 7 | 8 | 8 |
| 39 | 2 | - | - | - | - | - | - |
| 40 | 2 | - | - | - | - | - | - |
| 41 | 3 | - | - | - | - | - | - |
| 42 | 3 | - | - | - | - | - | - |

## APPENDIX C

## WATER QUALITY (TELEMAC 3D TIDAL FLOW AND SEDIMENT PLUME MODELLING)

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# 1 INTRODUCTION

1.1 It is proposed to carry out further reclamation in the Tsuen Wan Bay Area, the Area 35 Tsuen Wan Bay Further Reclamation. This reclamation would provide the necessary development areas for housing and industrial facilities, including open space amenity.

1.2 Hydraulics and Water Research (Asia) Ltd (HWR) have carried out tidal flow and water quality modelling to determine the possible impacts of the Tsuen Wan Bay Further Reclamation. The original study was carried out using the WAHMO suite of hydrodynamic and water quality models. Tidal flow and sediment plume modelling was carried out and an optimum shape for the reclamation was determined (Reference 1). Upon completion of the original study it was found that additional modelling of the reprovisioned Dangerous Goods Anchorage (DGA) at Ma Wan would be required. It was decided that more detailed modelling for the DGA would be required than was afforded by the WAHMO suite and it was agreed that the TELEMAC 3D model would be more appropriate. It was also decided that the more detailed TELEMAC 3D model should be used to assess the impacts of the Tsuen Wan Bay Further Reclamation and thereby obviate the need for further modelling at a later date.

1.3 This report describes the TELEMAC 3D tidal flow and sediment plume modelling for the Tsuen Wan Bay Further Reclamation. The TELEMAC 3D modelling of the impacts of the Ma Wan Dangerous Goods Anchorage will be reported upon separately. The TELEMAC 3D tidal flow and sediment plume modelling for the Tsuen Wan Bay Further Reclamation was divided into four Task items.

1.4 Task 1 consisted of the comparison of the TELEMAC 3D model of tidal flows with measured data for the dry season spring tide conditions. Following the comparison of the model simulations of the baseline conditions, defined as the coastline in the year 2004, and the completed Tsuen Wan Bay Further Reclamation were carried out for the dry season spring tide conditions in order to determine the effects of each of the proposed developments on tidal flows. Should the results from Task 1 have shown an unacceptable impact on tidal flows then the shape of the reclamation would have been modified and the new reclamation re-tested for the dry season spring tide under Task 2. This was not the case and Task 3 was carried out directly.

1.5 Task 3 consisted of the comparison of the TELEMAC 3D model of tidal flows with field data for the remaining three tide types; wet season spring tide and the wet and dry season neap tides. Following the comparison work flow model simulations for the three tides types were carried out for baseline and completed scenarios to determine the effects of the Tsuen Wan Bay Further Reclamation on tidal flows for these tides.

1.6 Task 4 comprised sediment plume modelling of the effects on water quality of fine sediment lost to suspension during the construction of the reclamation.

1.7 Tasks 1 and 3 are described in Chapter 2 of this report while the work for Task 4 is presented in Chapter 3. In Chapter 4 a summary and conclusions from the TELEMAC 3D modelling are given.

# 2 TELEMAC 3D TIDAL FLOW MODELLING

## 2.1 Description of the TELEMAC-3D Model of Tidal Flows

2.1.1 The TELEMAC 3D free surface flow and transport model was originally developed by LNH, Paris. It solves a three-dimensional version of the shallow water equations (ie it is valid for circumstances where vertical fluid accelerations are small compared with the acceleration due to gravity). These three dimensional equations are used in modelling coastal and estuarine flows, where vertical accelerations are small.

2.1.2 The model uses a finite element mesh in the horizontal direction made up of unstructured triangles, allowing a very flexible grid to be built that can follow accurately a complex coastline or bathymetry features such as navigation channels. In the vertical direction the model grid is developed by division into a number of layers which are specified as sigma coordinate planes with both the surface and bed remaining coordinate planes as the surface moves with the tide. Thus the grid moves, with element sizes in the vertical becoming larger as the water surface rises. The node locations in the vertical take positions at fixed proportions of the distance from surface to bed. Using this method there is always the same number of layers, unlike, for example, the WAHMO models where in shallow areas there may be one layer but in deeper waters there may be two.

2.1.3 The model comprises, at each timestep, the computation of the three-dimensional velocity components at each three-dimensional node and the water surface at each two dimensional location in plan. In addition to these hydrodynamic variables the salinity and/or temperature can also be included, as these variables can have an influence on the water density and therefore can drive flows in three dimensions. In carrying out this modelling it is also necessary to have a description of the way vertical mixing occurs as this redistributes both the horizontal momentum and the salt or heat. A mixing length theory technique is used in TELEMAC 3D to simulate turbulent mixing in the vertical together with damping functions used to decrease the turbulent mixing in the presence of stable stratification.

## 2.2 Modelled Area and Grid

2.2.1 The selected model area for the study of the hydraulic effects of the Tsuen Wan Bay Further Reclamation was the same as the Extended WAHMO model area (**Figure 1**). This was much larger than was needed purely to study the localised area under consideration but meant that the correct flow distribution could be modelled without any significant boundary effects. The mesh in the area of main interest was refined to give the necessary fine resolution of the main flow channels and of the various coastline features (**Figures 2a and 2b** ).

## 2.3 Comparison of the Flow Model Results with Field Data

### 2.3.1 Introduction

2.3.1.1 The model has been compared against field data for the four representative tide types found in Hong Kong; wet and dry season spring and neap tides. These tides have been chosen to give a range of tidal conditions, from the largest tidal range to the smallest tidal range, and cover both the wet and dry season conditions. The comparison of the TELEMAC-3D model of tidal flows with field data for these four tide types has been reported separately as part of this study (References 2, 3, 4 and 5) and is now brought together for this final report.

2.3.1.2 The model was set up for the 1990 coastline because that was the time at which the field data was measured. The model bathymetry was taken from the Extended WAHMO model (Reference 6) supplemented by further bathymetric data taken from the fine grid model used in the assessment of the Ting Kau Bridge (Reference 7).

2.3.1.3 The TELEMAC 3D flow model results have been compared against observations, made in 1990, of water level, current speed and salinity at a number of locations. **Figure 3** shows the locations of the water level sites and **Figure 4** the current speed and salinity sites. The model results for current speed and salinity have been compared with the observational data in the form in which it was prepared for the Extended WAHMO calibration (ie either total depth-averaged or top or bottom layer averaged values of the salinity or horizontal velocity components) by similarly averaging the present model results through the whole or partial depth.

2.3.1.4 The model was run including the salinity field. This is especially important in the wet season when the freshwater outflow from the Pearl Estuary gives rise to strong stratification is observed and which drives the residual flows. In the dry season simulations the salinity was included, although it was found to have little effect on the flows.

### 2.3.2 Dry Season Spring Tide

2.3.2.1 The TELEMAC model was run for the Extended WAHMO dry season spring calibration tide with 5 modelled planes (ie surface, bed and 3 intermediate layers). These layers were taken to be equally spaced through the water column. The model was run for a period of 37 hours of simulation (a 25 hour simulation preceded by a 12 hour run-in period).

2.3.2.2 The Extended WAHMO dry season spring calibration tide was derived from water level data measured during 1993. The field data for tidal currents at the eastern and western sites, which are being compared with the model results, was measured during 1990, and in order to show the comparison between the model tide and the actual tides upon which the field data was measured the model water level results are compared with the tides measured on the days upon which the current speeds were measured.

2.3.2.3 The freshwater flow at the head of the Pearl estuary was set at 1580m$^3$/s which is representative of the low flows observed during the dry season.

*Comparison with Tide Gauge Data*

2.3.2.4 The comparison of the modelled water levels and observed dry season spring tide water levels, observed on 8-9 February 1990, is shown in **Figure 5**. The observed tide on that day was very similar to the model and, as can be seen, the model is well able to represent the differences of tidal range, shape and phase over the modelled area. A further comparison is shown in **Figure 6** for the observations at the same stations made on 10-11 February 1990. The level of agreement between the model and observed water levels is not as good as for the observations on 8-9 February. Although the observed and model tidal ranges are similar the semi-diurnal phase of the tide is much flatter in the model tide than was measured on 10-11 February and as such the curve for the second, main flood phase of the tide is not as steep in the model as was the case on the day the water levels measurements were made. This is important to consider when evaluating the comparisons for the current speeds because the measurements in the North West New Territories stations were made on this tide.

*Comparisons with Current Meter Data*

2.3.2.5 The comparison of the model results with current speed observations made during February 1990 are shown in **Figures 7-10**.

2.3.2.6 The comparisons with the eastern locations (observed simultaneously on 8/2/90) are shown for surface and bed in **Figures 9 and 10** respectively. At these locations there is a good modelling of the current speeds in the surface and bed layers. The directions are also well predicted by the model. The comparison, especially with the sites E4-6 (closest to the Rambler Channel), shows the model results are very similar to the observations even though the variations in the observed speeds vary considerably between the different sites.

2.3.2.7 Comparisons are shown in **Figures 7 and 8** for the surface and bed current speeds and directions for the North West New Territories stations W1-6 which were observed on 10/2/90. The model results are generally good although there is a tendency for the flood phases of the current to be under predicted at most locations. This may be due to the tide on the day of the observations having a steeper flood tide compared with that modelled, as discussed in the previous section. The distribution of the current between the surface and bed layers is also well simulated by the model as are the flow directions.

*Conclusions*

2.3.2.8 The model results have been compared with field data at the relevant locations for a dry season spring tide and a good agreement found. The model is considered to be wholly adequate for the study of the impact of the Tsuen Wan Bay Further Reclamation during dry season spring tide conditions.

### 2.3.3 Wet Season Spring Tide

2.3.3.1 The TELEMAC model was run for the wet season spring tide comparison with 5 modelled planes (ie surface, bed and 3 intermediate layers). These layers were taken to be equally spaced through the water column. The model was run for a period of 37 hours of simulation (a 25 hour simulation preceded by a 12 hour run-in period).

2.3.3.2 The water level boundary condition was taken from the dry season spring tide run of the Extended WAHMO model because the Extended WAHMO wet season calibration tide was smaller than the tide during which the 1990 current speeds were measured. The fresh water discharge at the top of the Pearl estuary was also increased compared to the extended WAHMO work in order to account for the fact that August 1992 (for which the extended WAHMO model was run) was an exceptionally dry wet season period. The freshwater flow at the head of the Pearl estuary was set at 16800m$^3$/s which is more representative of typical wet season flows from the Pearl Estuary than was used previously.

*Comparison with Tide Gauge Data*

2.3.3.3 The modelled water elevations have been compared with those observed on the appropriate days of the current meter observations ie 21/22 June 1990 for the eastern locations (**Figure 11**) and 23/24 June 1990 for the North West New Territories locations (**Figure 12**). The comparisons of water levels for both of the measurement days are in good agreement which demonstrates the validity of the tide selection.

*Comparisons with Current Meter Data*

2.3.3.4 Comparisons are shown in **Figures 13 and 14** for the surface and bed current speeds for the North West New Territories observation stations W1-6. The model results are good in the main although at W1 the distribution of the ebb current is rather more at the surface and less at the bed compared with the observations. At some locations (W1 and W5) the flood tide currents are rather weak. This may be due to the tide having a slightly different shape during the flood tide period. A similar slightly weak flood tide occurred at W1 during the dry spring simulation indicating that this results from the imposed tide rather than from the gravitational circulation.

2.3.3.5 The salinities for the surface and bed locations at the NWNT locations are shown in **Figure15**. The simulation is very successful with the difference between surface and bed layers well simulated. The variation through the tide is well captured, especially at location W6, and the model also reproduces (for example at W6) the periods of stratification and destratification that arise during the tide.

2.3.3.6 The comparisons with the eastern locations are shown in **Figures 16 and 17** for surface and bed respectively. Generally the flood tide is well simulated (except at E2 which is very distant from the area of interest). The model also reproduces well the flood tide current speeds at the bed locations where, at some locations (eg E3 and E6) the current speed is higher at the bed because of the action of the gravitational circulation which is clearly very well represented in the model. At location E3 the model reproduces the feature that the surface shows two flood periods separated by an ebb period whereas in the bed layer both the model and observations display no secondary ebb phase but only two stronger flood periods. On the main ebb tides the modelled current is weaker than observed at E3 at the surface and especially at E6. It is however noticeable that at other locations (E2, E4, E5 and EW) the ebb current is satisfactorily modelled. The salinities at the eastern locations (**Figure 18**) are all well simulated, with the observed stratification being well reproduced.

2.3.3.7 On the ebb tide the flows that pass W1 subsequently pass around either side of Ma Wan before passing E6. Thus it is curious that the model matches the ebb speeds at W1 but at E6 the model under-predicts the peak speeds. It is the same body of water which is flowing past W1 and E6 and it would not therefore be possible to match both the peaks at W1 and E6 because the volume of water passing E6 would have to be greater than at W1. The reason for the differences at W1 and E6 may be because the observations at W1 and E6 were measured on separate days and the tides between the two days were different giving rise to different tidal volumes on each of the days whereas the model is simulating a single tide. It is therefore not regarded as a weakness that the model under predicts the current at the surface at E6 because such a high current could not be predicted without inconsistency with the observation at W1.

2.3.3.8 In order to resolve this discrepancy in the observations further comparison data was chosen. The data is from a survey carried out for BMT during a wet season spring tide of 1986 and the surface and bed layer observations are again compared with the model results. The locations of the current meters are shown in **Figure 19**. The comparisons between the model results and observations for the surface and bed layer currents are shown in **Figures 20 and 21**. The ebb tide is of most interest in clarifying the reasons for the difference in the flows at W1 and E6. Here it can be seen that the ebb tide agrees well between the model at all of the locations. This provides extremely good evidence that the model is reproducing correctly the ebb tide in the area of greatest interest. Even at the most southern positions (5CC and 6AA) the current speed in the model is large enough and it is expected to weaken as the flow spreads out to the south so the high current observed at E6 appears to be surprising. The flood tide at these locations is generally well modelled although with some tendency to be a little low.

*Conclusions*

2.3.3.9 The observations show how varied the flow can be during a wet season spring tide and the model has shown that it can represent this variation well. The currents are generally well represented by the flow model although there is a discrepancy in the ebb tide current at E6. However, the ebb tide current is well modelled at a number of alternative locations giving confidence that the model is wholly adequate to study the effects the Tsuen Wan Bay Further Reclamation.

### 2.3.4 Dry Season Neap Tide

2.3.4.1 The TELEMAC model was run for the dry season neap tide comparison with 5 modelled planes (ie surface, bed and 3 intermediate layers). These layers were taken to be equally spaced through the water column. The model was run for a period of 66 hours of simulation (a 54 hour simulation preceded by a 12 hour run-in period).

2.3.4.2 The water level boundary condition was taken from observations of tidal levels taken at various positions in Hong Kong Coastal Waters on 13/2/1990 to 15/2/1990, which was the period during which the observations of dry season neap tide currents and salinities were made in Victoria Harbor and the North West New Territories. The observed levels were filtered to reduce the tendency to oscillations and interpolated onto the model boundary nodes. The fresh water discharge at the top of the Pearl estuary was the same as previously adopted for the modelling of the dry season spring tide (which was measured 5 days earlier), 1580m$^3$/s.

*Comparison with Tide Gauge Data*

2.3.4.3 The comparison of the modelled and measured dry season neap tide levels, observed on 13/2/1990 to 15/2/1990, is shown in **Figures 22 and 23**. The model simulation is shown to be in good agreement with the tidal levels observed during the dry season neap survey period including differences in shape and tidal range between different sites. As was previously the case with the wet neap tide there is a consistent difference between the model and observed tidal levels at the Macau location which is because of the uncertainty of the datum used to reduce the Macau levels. This is explained in more detail in the wet season neap tide calibration report.

*Comparisons with Current Meter Data*

2.3.4.4 The comparisons with the current speed and direction at the Victoria harbour locations are shown in **Figures 26 and 27** for the surface and bed layers respectively. The comparison is with the model run for the same period. The comparison between the model results and the field observations are good at these locations. Neither the observations or the model simulation shown any effect of gravitational circulation, as shown by the fact that the bed layer currents are very similar to the surface layer ones but slightly smaller, whereas the effects of salinity were clearly apparent in the wet season neap tide results and field data.

2.3.4.5 Comparisons are shown in **Figures 24 and 25** for the surface and bed layer current speeds for the North West New Territories observation stations W1-6. The agreement is good at the different sites except that the flood tide at W1 is under predicted by some 30%. The reason for this is not clear although it also happens on other tides (eg dry spring) and also with other models(eg lower layer WAHMO North West New Territories, Extended WAHMO). The flood tide is well predicted at the other sites and the ebb tides correctly predicted at W1. As only this location shows such an effect it seems likely that some local effect is causing the higher current at W1 on the flood only ans should not affect the overall confidence in the use of the model.

*Conclusions*

2.3.4.6 The model has been found to give a good simulation of the currents at the observation points with the sole exception of the main flood tide at location W1 which is thought to be a localised effect. As such the model results can be treated with confidence as being wholly adequate to study the effects of engineering works during dry season neap tides for the Tsuen Wan Bay Further Reclamation.

### 2.3.5 Wet Season Neap Tide

2.3.5.1 The TELEMAC model was run for the wet season neap tide comparison tide with 5 modelled planes (ie surface, bed and 3 intermediate layers). These layers were taken to be equally spaced through the water column. The model was run for a period of 66 hours of simulation (a 54 hour simulation preceded by a 12 hour run-in period).

2.3.5.2 The water level boundary condition was taken from observations of tidal levels taken at various positions in Hong Kong Coastal Waters on 28/6/1990 to 1/7/1990, which was the period during which the observations of wet season neap tide currents and salinities were made in Victoria Harbour and North West New Territories. The observed levels were filtered to reduce any oscillations and interpolated onto the model boundary nodes. The freshwater flow at the head of the Pearl estuary was set at 16800m$^3$/s which represents the estimated freshwater discharge during the survey period.

*Comparison with Tide Gauge Data*

2.3.5.3 The comparison of the modelled and measured wet season neap tide levels, observed during the period 28/6/1990 to 1/7/1990, is shown in **Figures 28 and 29**. The model simulation is shown to reproduce well the observed water levels and the considerable difference in the tidal level between the periods when the Victoria Harbour and North West New Territories measurements were made. The tide gauge at Macau is stated in the survey report as "no level" and the reduction is given as "Macau Chart" which is not be the same datum as the model results, which are to Hong Kong Principal Datum. This explains the consistent differences between the modelled and observed water levels at this site.

*Comparisons with Current Meter Data*

2.3.5.4 The comparisons with the current speed and direction at the Victoria harbour locations, Stations E1-E6 are shown in **Figures 33 and 34** for the surface and bed layers respectively. The comparison is with the model tide simulating the period for which the current speeds were measured. The comparison of the model results with the field data is generally good at Stations E6, E5, E4 and E3 which are of most interest for this study. At Station E6 the peak ebb current is slightly under-predicted but the model agrees well with the observed current speeds at other times in the tidal cycle. The results demonstrate that the model is able to reproduce the impact of the gravitational circulation which enhances the ebb current at the surface and the flood tide near to the bed. The salinities at the Victoria harbour locations are also well simulated (**Figure 35**) showing the model is able to reproduce the observed stratification.

2.3.5.5 Comparisons are shown in **Figures 30 and 31** for the surface and bed current speeds for the North West New Territories observation stations W1-6. Of these the ones most relevant for the present study are W1 and W2. At these locations the currents in both layers are well simulated. The peak flood at the surface at W1 is slightly under-predicted but the peak flood in the bed layer is well reproduced.

2.3.5.6 The results at W3, W4, W5 and W6 show unusual features. At W5 the model flood is stronger in the bed layer than the surface as would be expected because of the gravitational circulation. The observations show the opposite to be occurring. It may be that the wind blowing during the observation period was the origin of this inversion of the normal circulation pattern. At position W6 the observed ebb tide is stronger in the lower layer than the upper layer, the opposite to what would be expected as the freshwater outflow from the Pearl Estuary increases the strength of the ebb in the surface layer. Similarly at W3 and W4, where the observed and model results represent depth-averages, there are differences between the model and the observations. At W3 the same flood-directed wind, as deduced from the observations at W5 and W6, results in the ebb directed current being nearly suppressed. These sites are far away from the area of interest in the present study and it seems likely that the flows at these locations were affected by winds blowing during the survey period.

2.3.5.7 The salinities for the surface and bed layers at the NWNT locations are presented in **Figure 32**. The simulation is shown to well reproduce the observed difference between the salinities in the surface and bed layers. The variation in salinity through the tide is also well represented, especially at location W6.

*Conclusions*

2.3.5.8 The observations show how varied the flow can be during a wet neap tide and the model has been shown to represent the observed tidal currents well. The currents are generally well represented by the flow model in the area of interest giving confidence that the model is wholly adequate to study the effects of engineering works during wet season neap tides in Tsuen Wan Bay.

## 2.4 Flow Model Simulations

### 2.4.1 Flow Model Scenarios

2.4.1.1 The flow model was used to simulate a baseline scenario for the year 2004 and the baseline scenario plus the completed Tsuen Wan Bay Further Reclamation (TWBFR) to determine the impacts of the TWBFR on tidal flows. Both scenarios were simulated for the four representative tide types; wet and dry season spring and neap tides.

2.4.1.2 The model was updated to produce a new baseline case which was intended to simulate the expected coastline in 2004. This was the case against which the simulations including the completed TWBFR would be compared.

2.4.1.3 To update the model bathymetry and coastline the following developments were included (see **Figure 36**);

Developments 1990-1996:
West Kowloon Reclamation,
Container Terminal 8,
Central Reclamation Phases I and II,
Hong Kong Convention and Exhibition Centre,
Chek Lap Kok airport platform,
North Lantau reclamations,
Re-aligned fairway south of Tsing Yi,

Developments 1996 - 2004
Container Terminal 9,
Container Terminals 10 and 11,
Ting Kau Bridge pier (Binnie's layout),
Ting Kau and Sham Tseng Sewerage Scheme Reclamation,
Central Reclamation Phase III,
River Trade Terminal,
Rambler Channel dredging to -15m PD,
Tsing Ma and Kap Shui Mun bridge piers,
Stonecutter's Island Naval Base.

2.4.1.4 The model mesh and bathymetry were updated to include the above (**Figures 37a and 38**). The model extent was the same as for the calibration layout (**Figures 1 and 2a**).

2.4.1.5 The TWBFR was then included in the model mesh which was refined in the vicinity of the reclamation to give the best possible representation of the shape of the reclamation including the sections with sloping sea wall. This was achieved by inserting extra nodes positioned at the base of the proposed sloping sea wall with a minimum grid size of 20m (**Figure 37b**). It should be noted that the completed TWBFR also includes the KCRC West Rail reclamation because the KCRC reclamation will form an integrated development with the TWBFR.

2.4.1.6 In Task 1 of this study the impact of the completed TWBFR on tidal flows was simulated for the dry season spring tide (Reference 2). The results showed only a very small impact on tidal flows in the Rambler Channel. Following this work the size of the reclamation was increased slightly by extending the face of the reclamation further south in order to maximise the available land area for housing. The larger TWBFR reclamation was then tested in Task 3 for the remaining three tide types; the wet season spring tide and the wet and dry season spring and neap tides.

2.4.1.7 The results from the flow model simulations have been analysed to give total ebb and flood discharges across the major flow channels into and out of the Western Harbour and Victoria Harbour, including the Rambler Channel; the locations for the discharge sections are shown in **Figure 39**. The results from the 2004 Baseline and completed TWBFR have been compared to determine the changes in the tidal discharges as a result of the construction of the TWBFR.

2.4.1.8 Velocity vectors for peak ebb and peak flood tide at the water surface and at mid-depth have been produced for the baseline scenario for the whole of the Western Harbour, including the Rambler Channel, and as enlarged figures for the area around Tsuen Wan Bay for the baseline and completed scenarios to show whether the TWBFR is likely to cause any changes in the tidal current patterns. Contours of predicted changes in peak ebb and peak flood current speeds have been produced by comparing the baseline scenario with the completed scenario.

### 2.4.2 Dry Season Spring Tide Simulations

2.4.2.1 The velocity vectors for the baseline scenario covering the whole of the Western Harbour are shown in **Figures 40-43**. The largest current speeds are shown in the Ma Wan and Kap Shui Mun Channels on both the ebb and flood tides, with the ebb tide dominating. These figures show a large and complex area of eddies during the ebb tide between to the east of Ma Wan. Eddy patterns are also shown at both ends of the Rambler Channel west of the Ting Kau bridge and south of the Tsing Yi southern bridges. In the Rambler

Channel the highest current speeds are found at the locations of the two bridges where the channel narrows.

2.4.2.2 The velocity vectors for the Tsuen Wan Bay area are shown in **Figures 44-47** for the baseline scenario and **Figures 48-51** for the completed scenario. The figures show no discernible difference in the current patterns between the two scenarios.

2.4.2.3 The differences in the magnitude of the peak ebb and flood currents, with and without the reclamation are plotted on **Figures 52 and 53** to show the area of influence of the changes. Differences in the depth mean current are shown only in the immediate area of the reclamation, the greatest difference being an increase of approximately 0.2 m/s along the face of the seawall at the time of peak ebb currents.

2.4.2.4 The calculated discharges across the major flow channels, including the Rambler Channel are given in **Tables 1 and 2** for the baseline and completed scenarios respectively. The changes in the discharges through the Rambler Channel following construction of the TWBFR are shown to be reductions of 1.94% on the ebb tide and 1.88% on the flood tide. These values are low and reflect the fact that the reclamation is contained within the sheltered area of Tsuen Wan Bay and hence does not greatly influence the tidal flows through the Rambler Channel for the dry season spring tide conditions. At the other sections changes in tidal volumes are shown to be less than 1%.

### 2.4.3 Wet Season Spring Tide Simulations

2.4.3.1 The velocity vectors for the baseline scenario covering the whole of the Western Harbour are shown in **Figures 54-57**. As for the dry season spring tide the highest current speeds are shown in the Ma Wan and Kap Shui Mun Channels. The ebb current is much stronger than the flood current because of the freshwater outflow from the Pearl Estuary. A large area of complex eddies are shown to the east of Ma Wan Island. Eddies are also shown at the at both ends of the Rambler Channel, to the west of the Ting Kau Bridge and south of the southern Tsing Yi Bridges.

2.4.3.2 The velocity vectors for the Tsuen Wan Bay area are shown in **Figures 58-61** for the baseline scenario and **Figures 62-65** for the completed scenario. The figures show no discernible difference in the current patterns between the two scenarios.

2.4.3.3 The differences in the surface and mid-depth currents are shown in **Figures 66 and 67** for the peak flood and in **Figures 68 and 69** for the peak ebb. The majority of the differences in current speed are increases in the area in front of the reclamation. The largest changes in current speed are immediately seaward of the reclamation with speed increases of up tp 0.3m/s predicted. Speed decreases are also shown at either end of the reclamation and, for the ebb currents at mid-depth, along the north-eastern shoreline of

Tsing Yi Island.

2.4.3.4 The calculated discharges across the major flow channels, including the Rambler Channel are given in **Tables 3 and 4** for the baseline and completed scenarios respectively. The tables show that, in the Rambler Channel, the discharge is more ebb dominated than for the dry season spring tide which is a result of the density stratification. The changes in discharge through the Rambler Channel following construction of the TWBFR are shown to be reductions of 2.02% on the ebb tide and 1.50% on the flood tide. The ebb reduction is greater than for the dry season spring tide (1.94%) but the flood reduction is less (1.88%). Overall the impacts on discharges through the Rambler Channel on the wet season spring tide are small. At the Victoria Harbour section there is a 1.77% reduction on the ebb tide, but at all the other sections the changes in discharge are less than 1%.

### 2.4.4 Dry Season Neap Tide Simulations

2.4.4.1 The velocity vectors for the baseline scenario covering the whole of the Western Harbour are shown in **Figures 70-73**. The neap tide currents are much less than the spring tide currents because of the much smaller tidal range. The patterns of the vectors are similar to those for the dry season spring tide.

2.4.4.2 The velocity vectors for the Tsuen Wan Bay area are shown in **Figures 74-77** for the baseline scenario and **Figures 78-81** for the completed scenario. The figures show no discernible difference in the current patterns between the two scenarios.

2.4.4.3 The differences in the magnitude of the peak ebb and flood currents, with and without the reclamation are plotted on **Figures 82 and 83** to show the area of influence of the changes. The figures show that the speed changes are agin confined close to the vicinity of the reclamation and that the maximum changes are speed increases of the order of 0.2m/s.

2.4.4.4 The calculated discharges across the major flow channels, including the Rambler Channel are given in **Tables 5 and 6** for the baseline and completed scenarios respectively. The tables show that the ebb and flood discharges at all sections are considerable less than those for the spring tides which is because of the smaller tidal range for a neap tide. The changes in discharge through the Rambler Channel are shown to be decreases of 2.96% on the ebb tide and 3.17% on the flood tide. These percentage changes are larger than for either of the spring tides but in terms of absolute magnitude of change in discharge are much less. The large percentage changes are shown because smaller changes in discharge when compared with low baseline discharges gives rise to a large percentage change. At the other sections the changes in discharge are all less than 1%.

### 2.4.5 Wet Season Neap Tide Simulations

2.4.5.1 The velocity vectors for the baseline scenario covering the whole of the Western Harbour are shown in **Figures 84-87**. As for the dry season neap tide vectors the patterns are similar to the wet season spring tide but are reduced in magnitude.

2.4.5.2 The velocity vectors for the Tsuen Wan Bay area are shown in **Figures 88-91** for the baseline scenario and **Figures 92-95** for the completed scenario. The figures show no discernible difference in the current patterns between the two scenarios.

2.4.5.3 The differences in the surface and mid-depth currents are shown in **Figures 96 and 97** for the peak flood and in **Figures 98 and 99** for the peak ebb. The changes to the current speeds are again limited to the frontage of the reclamation. At mid-depth the largest speed changes are shown to be around 0.1m/s while at the surface changes are larger, up to 0.2m/s.

2.4.5.4 The calculated discharges across the major flow channels, including the Rambler Channel are given in **Tables 7 and 8** for the baseline and completed scenarios respectively. The changes in discharge through the Rambler Channel have been calculated to be reductions of 1.97% on the ebb tide and 2.20% on the flood tide. These changes are similar to those predicted for the wet season spring tide and are again small. At the other sections changes in the discharges are all shown to be less than 1%.

# 3 SEDIMENT PLUME MODELLING

## 3.1 Introduction

3.1.1 The construction of the Tsuen Wan Bay Further Reclamation will involve the dredging of mud from the sea bed to form trenches for the sea wall foundations, disposing of this material in the reclamation area and sand filling of the reclamation area. The dredging will be carried out by grab dredgers while the disposal of the mud and sand filling will be by bottom dumping from barges.

3.1.2 During the dredging, dumping and filling work a quantities of fine sediment will be lost to suspension. Once in suspension, the fine sediment will be carried by the tidal currents and dispersed, possibly over a large area depending on tidal conditions. During transport by the tidal currents, the fine sediment will tend to flocculate forming larger particles and settle under gravity to the seabed. The rate of settling for cohesive sediments will depend on the concentration and on the local tidal currents. Once the tidal currents become sufficiently weak, the sediment will settle to the seabed and begin to consolidate. If the tidal currents become large enough, the settled material will be eroded and put back into suspension for further transport by the tidal currents, where the rate of erosion will depend on the tidal currents and the degree of consolidation which may have taken place.

3.1.3 The TELEMAC 3D sediment plume model was designed to simulate these processes of transport, deposition and re-erosion for narrow sediment plumes formed during dredging activities and was used in this study.

## 3.2 Description of the TELEMAC 3D Sediment Plume Model

3.2.1 The TELEMAC 3D sediment plume model simulates the transport and dispersion of sediment in suspension using a random walk technique and includes the processes of deposition and erosion at the seabed. As basic tidal flow data, the plume model uses results from the TELEMAC 3D model of tidal flows.

3.2.2 The plume model simulates the loss of sediment to suspension by introducing particles into the model area at specified locations and positions within the water column. The particles are released at a set rate and are given a fixed mass to simulate the rate of sediment loss. The particles are tracked throughout the model and, at specified storage intervals the number of particles in each cell is summed and the concentration of sediment calculated. The output of the sediment plume model is based on a square grid, the size for which is defined by the user and may be finer than the smallest element in the flow model. The sediment plume model uses the same layering system as the model of tidal flows and gives a detailed representation of the vertical structure of the sediment plumes.

### 3.3 Scenarios Simulated by the Sediment Plume Model

3.3.1 It was determined that the highest rates of dredging and filling would occur during the early stages of the construction of the Tsuen Wan Bay Further Reclamation. At this time the construction programme indicated that four activities would be concurrent :

1. Dredging the seawall trench.
2. Dumping of the dredged mud into Tsuen Wan Bay.
3. Sand Filling on top of the dumped mud.
4. Filling for the sand blanket on top of the existing mud.

3.3.2 The plant to be used for each of the activities and the rates of working are as follows :

1. 2 grab dredgers for a total of 7,500 $m^3$/day
2. 2 bottom dumping barges for a total of 7,500 $m^3$/day
3. 2 barges for a total of 9,000 $m^3$/day.
4. 1 barge for a total of 4,500 $m^3$/day

3.3.3 The length of the working day will be limited to 12 hours because of noise considerations due to the proximity of residential areas to the reclamation.

3.3.4 The total rates of fine sediment lost to suspension which were simulated in the sediment plume model for each of the activities are as follows; a derivation of the loss rates is given in Appendix A. For each activity the losses were input at release points, the locations for which are shown in **Figure 100**, which corresponded to the plant which would be carrying out the activities.

1. Dredging the seawall trench, 4.24 kg/s. Two loss points with 2.12 kg/s at each loss point (Dredging 1 and 2).
2. Dumping of the dredged mud into Tsuen Wan Bay, 4.24 kg/s. Two loss points with 2.12 kg/s at each loss point (Dumping 1 and 2).
3. Sand Filling on top of the dumped mud, 9.82 kg/s. Two loss points with 4.91 kg/s at each loss point (Filling 1 and 2).

4. Filling for the sand blanket on top of the existing mud, 4.91 kg/s. One loss points with 4.91 kg/s at that point (Filling 3).

3.3.5 These rates were incorporated into the model by representing each release point as a circular area of 20m radius with a Gaussian distribution of loss to suspension over this area. The release of sediment into suspension was always at the sea surface so that settling of the sediment in the immediate vicinity of the release points was limited which gave a conservative simulation.

3.3.6 The flow data was provided by the TELEMAC 3D model of tidal flows which included the 2004 Baseline and the completed KCRC reclamation. These flow simulations were carried out as part of the EIA for the KCRC reclamation and are described in Reference 8. This data was used because the KCRC reclamation will be constructed prior the Tsuen Wan Bay Further Reclamation and thus gives the most representative flows at the time of construction. Flow data was available for the dry season spring tide and the wet season neap tide which means that the sediment plume simulations were carried out to represent the range of conditions in Hong Kong waters in terms of tidal range and seasonal conditions.

3.3.7 For each of the two simulations the model results have been presented in a set of four figures, consisting of:

- contours of suspended sediment concentration, near surface (top 25% of the water column) and near bed bottom 25% of the water column), at two times in the tide, corresponding to maximum dispersion of the plume in the flood direction and maximum dispersion in the ebb direction. The actual times relative to high water are shown on each figure.

- contours of net sediment deposition over one tide, showing the volume and location of deposited sediments.

- time series through the tidal cycle of suspended sediment concentrations at four depth intervals for the sensitive receiver locations of the beaches to the west and in the southern part of Rambler Channel (**Figures 100 and 101**).

- time series through the tidal cycle of suspended sediment concentrations at four depth intervals for the sensitive receiver locations in Tsuen Wan and in the northern part of Rambler Channel (**Figures 100 and 101**). The 'Tsuen Wan Intake' represents the WSD intake which will be re-provisioned as part of the KCRC reclamation while the 'Temporary Intake' represents a cooling water intake which will also be reprovisioned during the construction of the KCRC reclamation.

## 3.4 Results from the Sediment Plume Simulations

### 3.4.1 Suspended Sediment Concentrations

3.4.4.1 The plume dispersion figures show the instantaneous suspended sediment concentrations near the bed and near the surface for the dry season spring tide (**Figures 104 and 105**) and wet season neap tide (**Figure 109**) scenarios at the two times in the tidal cycle where dispersion of the plume is at its greatest. In the case of the dry spring scenario these times were found to be at 10 hours after High Water (for the ebb tide) and 3 hours after High Water (for the flood tide). In the case of the wet neap scenario these times were found to be at 23 hours after High Water (for the flood tide) and 18 hours after High Water (for the ebb tide).

3.4.4.2 For both scenarios the plume travels a greater distance on the ebb than on the flood. The dry spring plume travels into the Northern Fairway while the wet neap plume merely reaches the Kwai Chung container terminal. The dry spring scenario shows a much greater excursion of the plume on the ebb tide than for the wet neap scenario. Similarly, on the flood tide the plume excursion is significantly larger for the dry spring scenario than for the wet neap. The greater excursion is because of the much larger current speeds in the Rambler Channel for the dry season spring tide.

3.4.4.3 Time series plots for suspended sediment concentration at locations of sensitive receivers were established for the beaches to the west, for points along the edges of the of Rambler channel, for the Tsing Yi power station cooling water intake and for intakes in Tsuen Wan, near the release points. The dry season spring tide results are shown in Figures **102 and 103** and the dry season neap tide results in **Figures 107 and 108**. The main features of the time series are as follows:

- The suspended sediment concentrations are small (less than 1 ppm on both tides) for the four beaches to the west.
- The suspended sediment plume reaches as far as Stage I Phase I Intake, Oil Depot Pump House South and even Tsing Yi PS, on the dry spring tide where concentrations reaching close to 5 ppm were observed. However, on the wet neap tide, the concentrations at these three sites barely reach 1 ppm.
- The suspended sediment concentrations at Kwai Chung Incinerator are more significant, reaching 15 ppm for the dry spring tide and 10 ppm for the wet neap tide because the location is adjacent to the path of the plume

on the ebb tide.

- The peak suspended sediment concentrations at sensitive receivers closest to the release points are higher on the wet neap tide than on the dry spring tide. The largest concentrations are at Tsuen Wan Intake and at the temporary intake and are respectively over 100 ppm and 50 ppm for the neap tide, and approximately 50 ppm and 30 ppm on the spring tide. This is because the lower tidal currents on the wet neap tide result in less dispersion of the plume.

### 3.4.2 Sediment Deposition

3.4.2.1 The predicted sediment deposition over a whole tidal cycle was predicted for the dry season spring tide and wet season neap tide simulations and the results presented as contour plots of net deposition over a tidal cycle. The dry season spring tide results are shown in **Figure 106** and the wet season neap tide results in **Figure 110**. The main features of the results are as follows:

- In both scenarios the main areas of deposition are experienced in the vicinity of the release points and in the northern part of Tsuen Wan.
- Further sedimentation occurs in the deepened area of the Kwai Chung container terminal on dry springs and just south of the Tsing Yi Bridge on wet neaps.
- There is also some deposition in the channel to the north of Tsing Yi during the wet neap
- For both the wet neap and dry spring scenarios, the maximum deposition rates occur near the release points at a rate of 10 $kg/m^2/day$.

# 4 SUMMARY AND CONCLUSIONS

4.1 This working paper has described the TELEMAC 3D tidal flow and sediment plume modelling which has been carried out to determine the potential impacts of the proposed Tsuen Wan Bay Further Reclamation on tidal flows and water quality.

4.2 The tidal flow modelling was carried out using the TELEMAC 3D tidal flow model. The model was first calibrated against available field data for the four representative tide types found in Hong Kong; the wet and dry season spring and neap tides. Following the satisfactory outcome of the calibration exercise the TELEMAC 3D flow model was used to simulate for the four representative tide types a baseline layout which was representative of the expected coastline in the year 2004. The Tsuen Wan Bay Further Reclamation was then inserted into the flow model mesh and the tidal flow simulations repeated for the four representative tide types. The results from the two flow model scenarios were compared to determine the effects of the Tsuen Wan Bay Further Reclamation on tidal flows. The conclusions from the TELEMAC 3D flow modelling are as follows :

- The reclamation was found to not effect tidal current patterns in the Rambler Channel.

- Peak ebb and flood currents were found to increase by up to 0.2m/s along the face of the reclamation, with the area of speed increase being limited to the length of the reclamation. Small current speed decreases were found at the western and eastern ends of the reclamation.

- The reclamation was found to reduce the total ebb and flood discharge volumes in the Rambler Channel. The largest reductions were found on the dry season neap tide and were calculated to be 2.96% on the ebb tide and 3.17% on the flood tide. For the other tide types the reductions in discharge were found to be around 2%. At the other channels the changes in the discharge volumes were generally less than 1%, except for the ebb tide for the wet season spring tide through Victoria Harbour where a 1.77% reduction was found.

4.3 The TELEMAC 3D sediment plume model was used to simulate the dispersion of fine sediment which could be lost to suspension during the construction of the Tsuen Wan Bay Further Reclamation. The expected worst case scenario in terms of sediment lost to suspension was found to consist of four concurrent activities; dredging the seawall trench, dumping the dredged mud into Tsuen Wan Bay, the initial stages of sandfilling on top of the dumped mud and laying the sand blanket on top of the existing mud in the bay. The sediment plume modelling was carried out for the dry season spring tide and the wet season neap tide using TELEMAC 3D tidal flow model results which included the KCRC reclamation. The results from the sediment plume modelling showed the following :

- The majority of the sediment plumes were contained within the Rambler Channel. Only on the ebb tide for the dry season spring tide simulation were suspended sediment concentrations found to have travelled through the southern entrance to the Rambler Channel.

- The highest impacts at the sensitive receivers were found at the two intakes close to the works, the Tsuen Wan Intake, the reprovisioned WSD intake, and the Temporary Intake, a reprovisioned cooling water intake. At other sensitive receivers in the Rambler Channel concentrations were low.

- The majority of the sediment lost to suspension was found to deposit in Tsuen Wan Bay, close to the loss points. Deposition was also found in the deep water channel off the Kwai Chung container terminals.

## 5 REFERENCES

1 Agreement No. CE26/94. Area 35 Tsuen Wan Bay Further Reclamation & Ma Wan Dangerous Goods Anchorage. Working Paper on Tidal Flow and Water Quality Modelling for Tsuen Wan Bay Reclamation. Territory Development Department. December 1995.

2 Agreement No. CE26/94. Area 35 Tsuen Wan Bay Further Reclamation & Ma Wan Dangerous Goods Anchorage. TELEMAC Model Calibration and Simulations for the Dry Season Spring Tide. Territory Development Department. December 1996.

3 Agreement No. CE26/94. Area 35 Tsuen Wan Bay Further Reclamation & Ma Wan Dangerous Goods Anchorage. Preliminary Report on the Wet Season Neap Tide Comparison with Field Data. April 1997.

4 Agreement No. CE26/94. Area 35 Tsuen Wan Bay Further Reclamation & Ma Wan Dangerous Goods Anchorage. Preliminary Report on the Wet Season Spring Tide Comparison with Field Data. May 1997.

5 Agreement No. CE26/94. Area 35 Tsuen Wan Bay Further Reclamation & Ma Wan Dangerous Goods Anchorage. Preliminary Report on the Dry Season Neap Tide Comparison with Field Data. June 1997.

6 Report (R7a). Tidal Flow Model Dry Season Calibration. SOM Consultants, September 1994.

7 Ting Kau Bridge Environmental Studies. Mathematical Modelling of the Effect of the TKCJV Bridge on Tidal Flows and Water Quality. Hydraulics and Water Research (Asia) Ltd Report HWR 127, November 1994.

8 Kowloon-Canton Railway Corporation. West Rail Project. Environmental Impact Assessment. Contract No. TS-900. TELEMAC 3D Modelling of Tidal Flows and Sediment Plume. Hydraulics and Water Research (Asia) Ltd HWR 189, June 1997.

# TABLES

| Discharge Section | Discharge Volume ($x10^6$ $m^3$) | |
|---|---|---|
| | Ebb | Flood |
| Victoria Harbour | 147.18 | 201.65 |
| Rambler Channel | 56.77 | 34.63 |
| Ma Wan | 617.66 | 602.19 |
| Kap Shui Mun | 232.67 | 261.75 |
| East Lamma Channel | 592.31 | 483.56 |
| West Lamma Channel | 426.07 | 524.54 |

**Table 1 Discharge Volumes for 2004 Baseline Scenario - Dry Season Spring Tide**

| Discharge Section | Discharge Volume ($x10^6$ $m^3$) | | Percentage Change from Baseline | |
|---|---|---|---|---|
| | Ebb | Flood | Ebb | Flood |
| Victoria Harbour | 146.71 | 201.15 | -0.32 | -0.25 |
| Rambler Channel | 55.67 | 33.98 | -1.94 | -1.88 |
| Ma Wan | 618.06 | 602.19 | +0.06 | 0.00 |
| Kap Shui Mun | 232.36 | 262.00 | -0.13 | +0.10 |
| East Lamma Channel | 591.38 | 482.55 | -0.16 | -0.21 |
| West Lamma Channel | 426.04 | 526.52 | -0.01 | +0.38 |

**Table 2 Discharge Volumes for 2004 Baseline Scenario + Tsuen Wan Bay Further Reclamation - Dry Season Spring Tide**

| Discharge Section | Discharge Volume (x$10^6$ $m^3$) | |
|---|---|---|
| | Ebb | Flood |
| Victoria Harbour | 44.05 | 176.70 |
| Rambler Channel | 79.66 | 14.43 |
| Ma Wan | 745.07 | 529.27 |
| Kap Shui Mun | 247.61 | 200.60 |
| East Lamma Channel | 400.27 | 370.11 |
| West Lamma Channel | 816.58 | 457.60 |

**Table 3 Discharge Volumes for 2004 Baseline Scenario - Wet Season Spring Tide**

| Discharge Section | Discharge Volume (x$10^6$ $m^3$) | | Percentage Change from Baseline | |
|---|---|---|---|---|
| | Ebb | Flood | Ebb | Flood |
| Victoria Harbour | 43.27 | 175.82 | -1.77 | -0.49 |
| Rambler Channel | 78.05 | 14.21 | -2.02 | -1.50 |
| Ma Wan | 743.87 | 528.28 | -0.16 | -0.19 |
| Kap Shui Mun | 246.71 | 200.48 | -0.37 | -0.06 |
| East Lamma Channel | 398.45 | 367.56 | -0.46 | -0.69 |
| West Lamma Channel | 817.29 | 459.13 | +0.09 | +0.33 |

**Table 4 Discharge Volumes for 2004 Baseline Scenario + Tsuen Wan Bay Further Reclamation - Wet Season Spring Tide**

| Discharge Section | Discharge Volume (x$10^6$ $m^3$) | |
|---|---|---|
| | Ebb | Flood |
| Victoria Harbour | 98.08 | 113.66 |
| Rambler Channel | 29.95 | 19.42 |
| Ma Wan | 361.72 | 310.78 |
| Kap Shui Mun | 127.23 | 131.22 |
| East Lamma Channel | 312.59 | 317.07 |
| West Lamma Channel | 165.52 | 97.03 |

**Table 5 Discharge Volumes for 2004 Baseline Scenario - Dry Season Neap Tide**

| Discharge Section | Discharge Volume (x$10^6$ $m^3$) | | Percentage Change from Baseline | |
|---|---|---|---|---|
| | Ebb | Flood | Ebb | Flood |
| Victoria Harbour | 98.01 | 113.37 | -0.06 | -0.25 |
| Rambler Channel | 29.06 | 18.81 | -2.96 | -3.17 |
| Ma Wan | 361.83 | 310.56 | +0.03 | -0.07 |
| Kap Shui Mun | 127.09 | 131.00 | -0.11 | -0.17 |
| East Lamma Channel | 312.54 | 316.58 | -0.02 | -0.15 |
| West Lamma Channel | 165.17 | 97.05 | -0.21 | +0.01 |

**Table 6 Discharge Volumes for 2004 Baseline Scenario + Tsuen Wan Bay Further Reclamation - Dry Season Neap Tide**

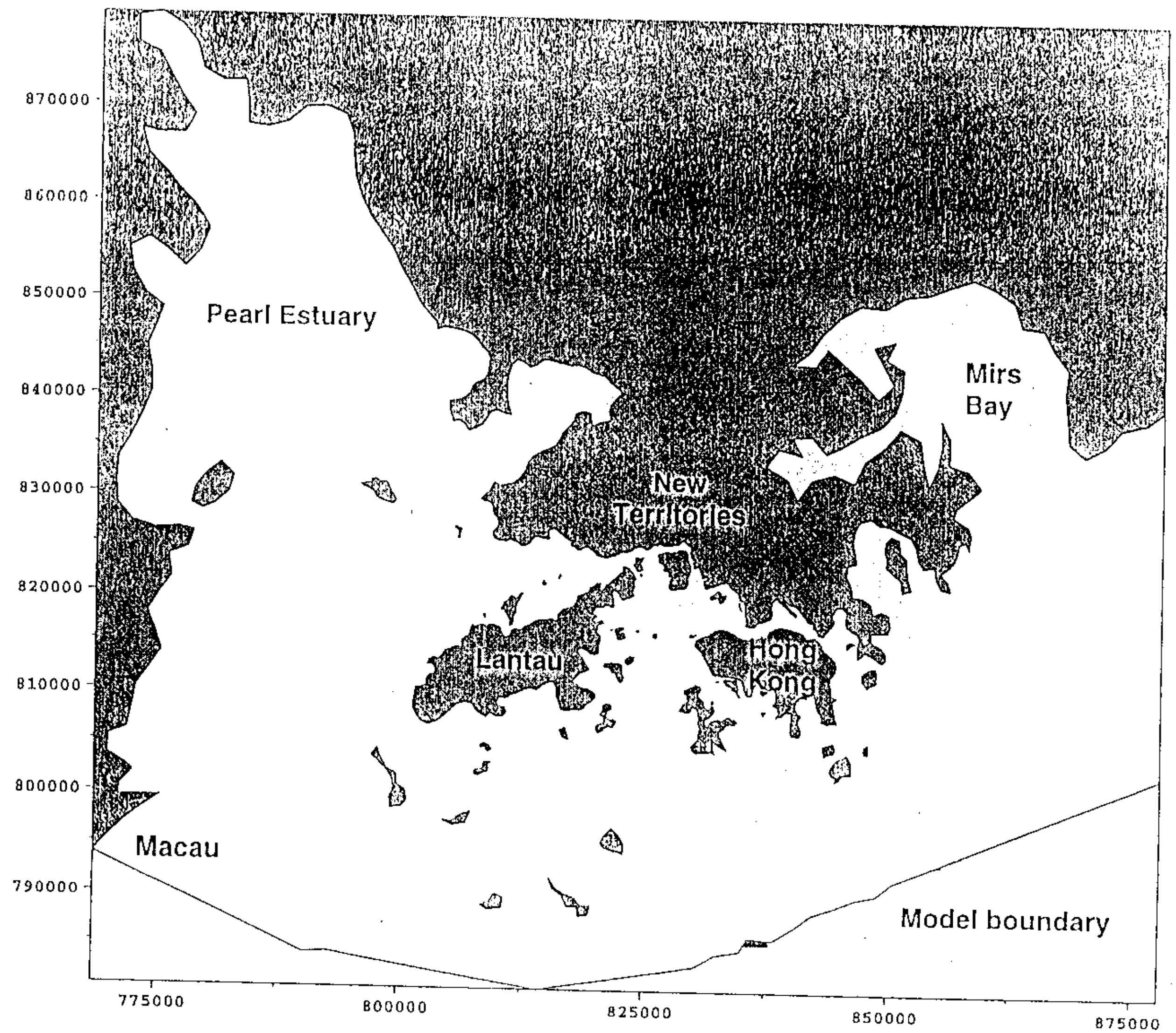
| Discharge Section | Discharge Volume ($x10^6$ $m^3$) | |
|---|---|---|
| | Ebb | Flood |
| Victoria Harbour | 42.58 | 82.65 |
| Rambler Channel | 43.16 | 11.87 |
| Ma Wan | 231.67 | 279.01 |
| Kap Shui Mun | 76.79 | 115.83 |
| East Lamma Channel | 32.83 | 328.68 |
| West Lamma Channel | 358.69 | 103.43 |

**Table 7 Discharge Volumes for 2004 Baseline Scenario - Wet Season Neap Tide**

| Discharge Section | Discharge Volume ($x10^6$ $m^3$) | | Percentage Change from Baseline | |
|---|---|---|---|---|
| | Ebb | Flood | Ebb | Flood |
| Victoria Harbour | 42.61 | 82.57 | +0.07 | -0.09 |
| Rambler Channel | 42.31 | 11.61 | -1.97 | -2.20 |
| Ma Wan | 230.97 | 278.91 | -0.30 | -0.04 |
| Kap Shui Mun | 76.37 | 115.71 | -0.55 | -0.10 |
| East Lamma Channel | 32.83 | 328.14 | 0.00 | -0.16 |
| West Lamma Channel | 357.65 | 103.83 | -0.29 | +0.39 |

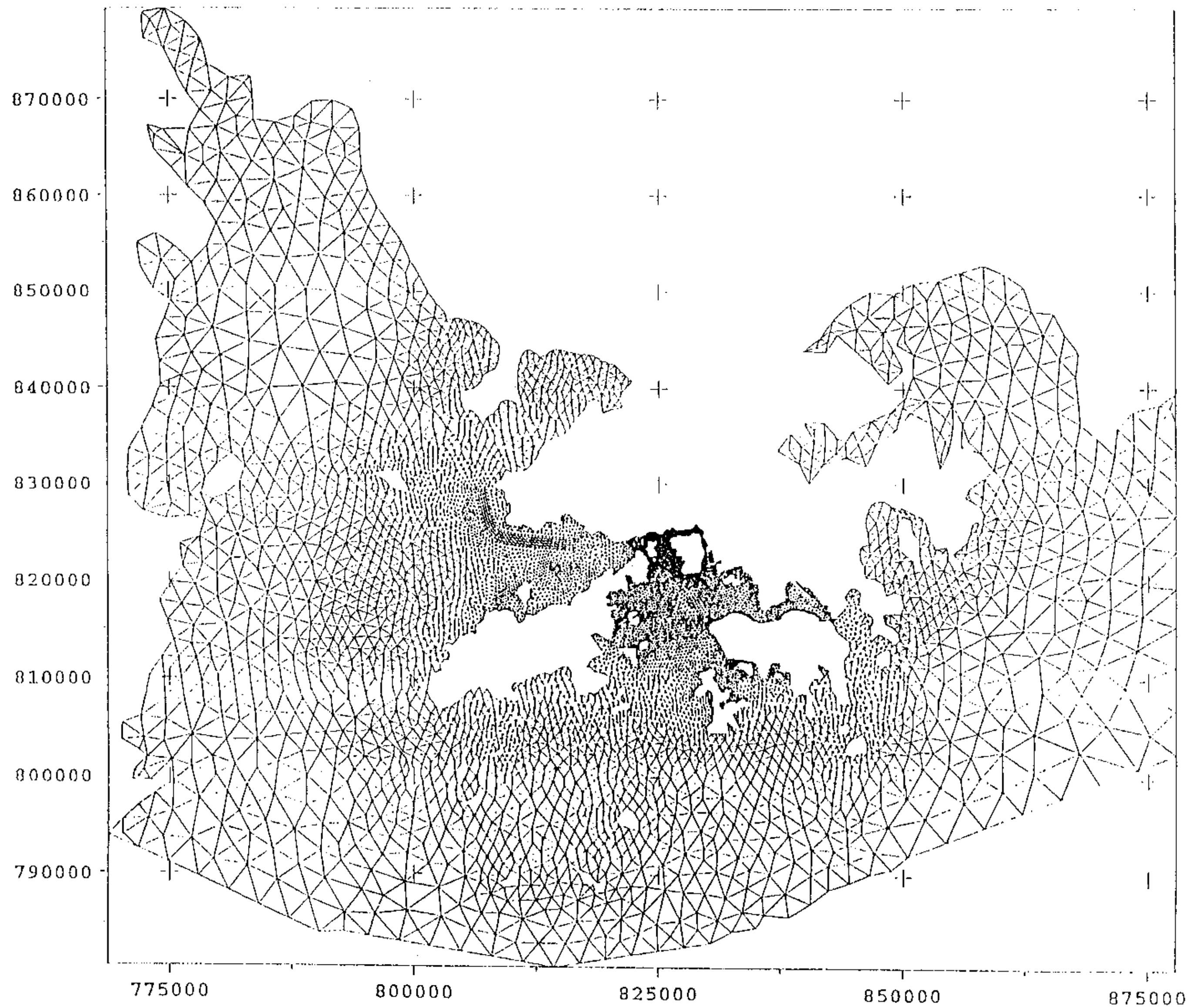
**Table 8 Discharge Volumes for 2004 Baseline Scenario + Tsuen Wan Bay Further Reclamation - Wet Season Neap Tide**

# FIGURES




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
TELEMAC 3D MODEL COVERAGE

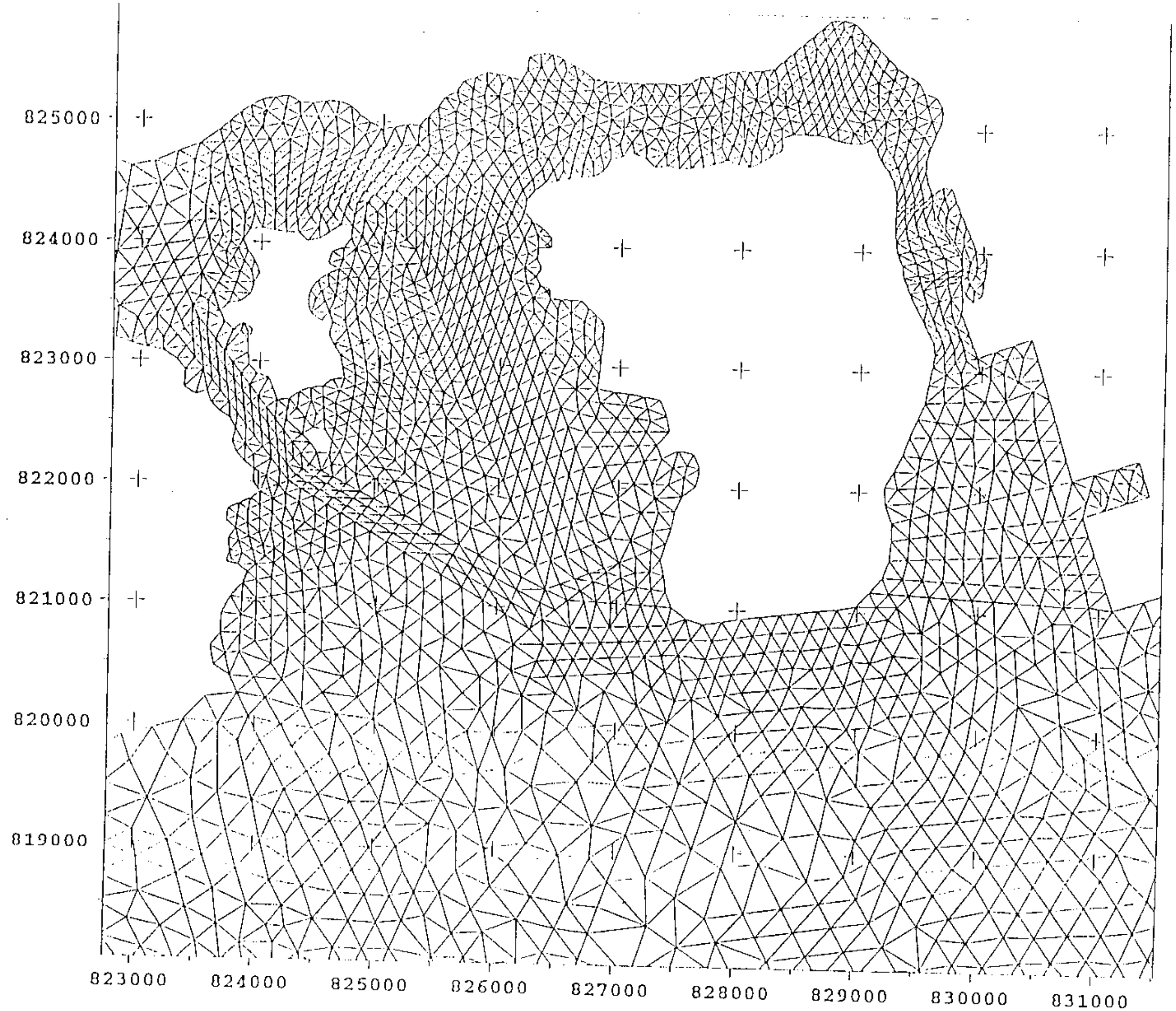
FIGURE 1




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

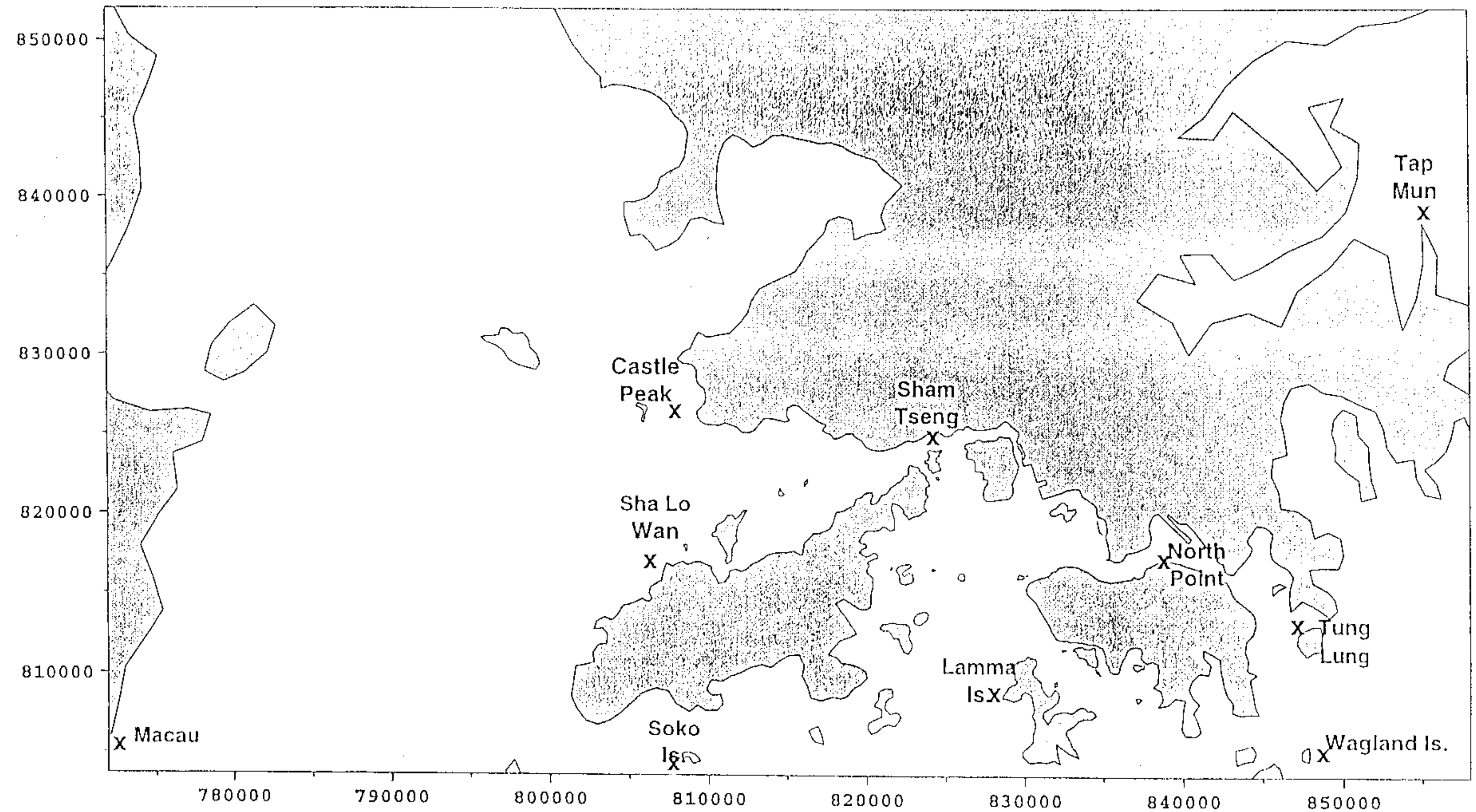
TELEMAC 3D MODEL MESH (WHOLE MODEL COVERAGE)

FIGURE 2a



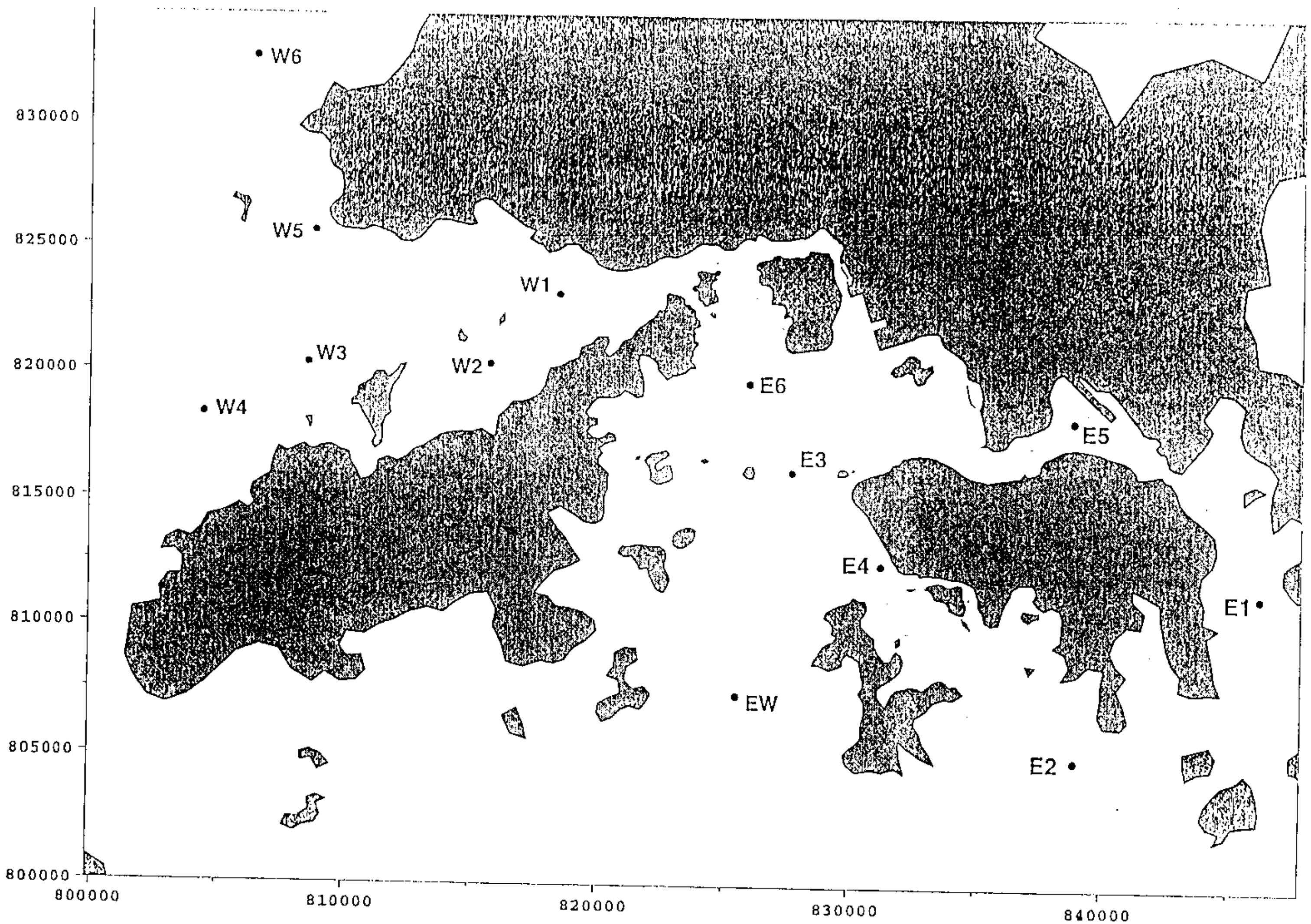

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
TELEMAC 3D MODEL MESH (EXPANDED VIEW)

FIGURE 2b

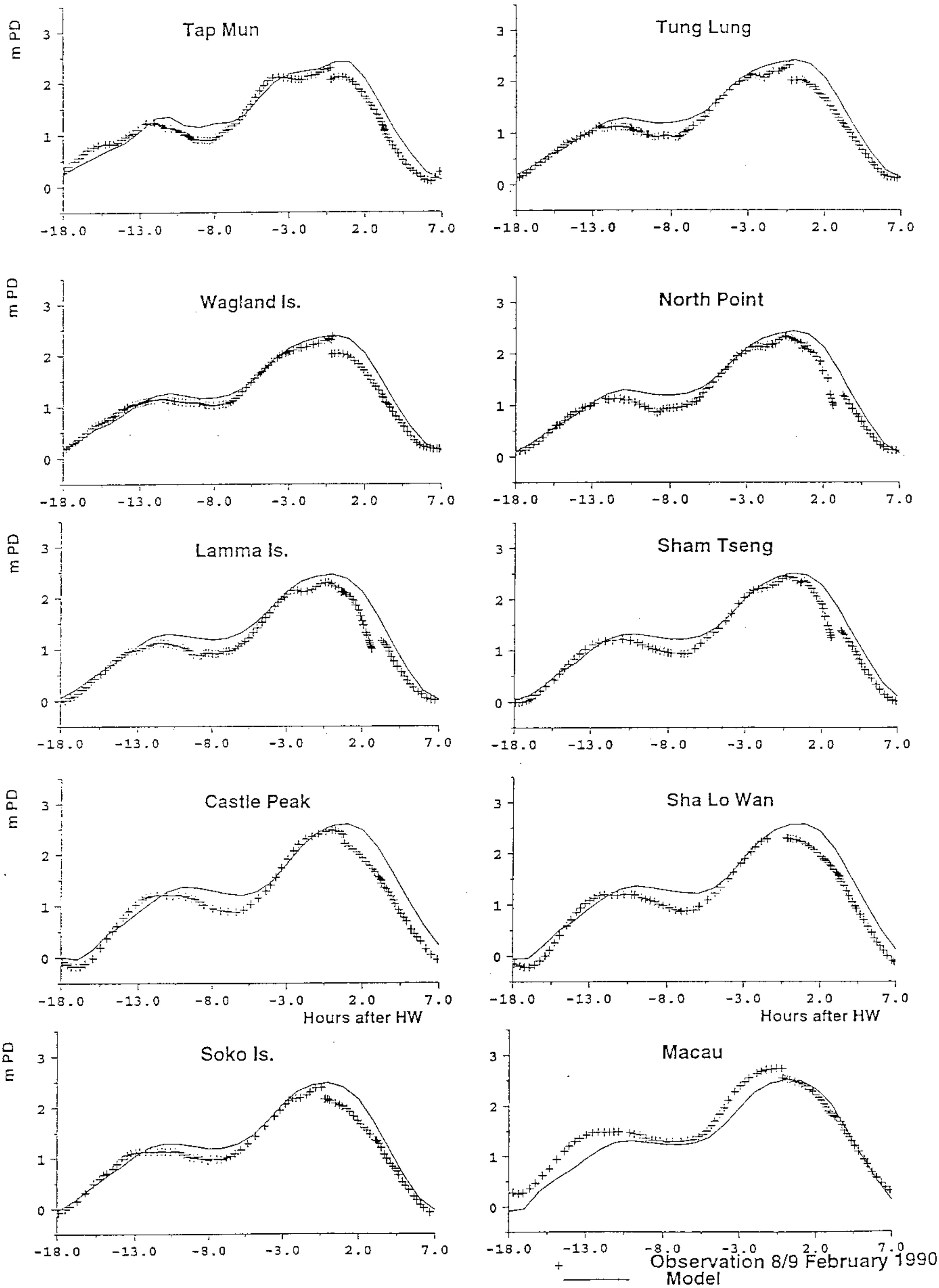



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
LOCATIONS OF TIDE GAUGES

FIGURE 3

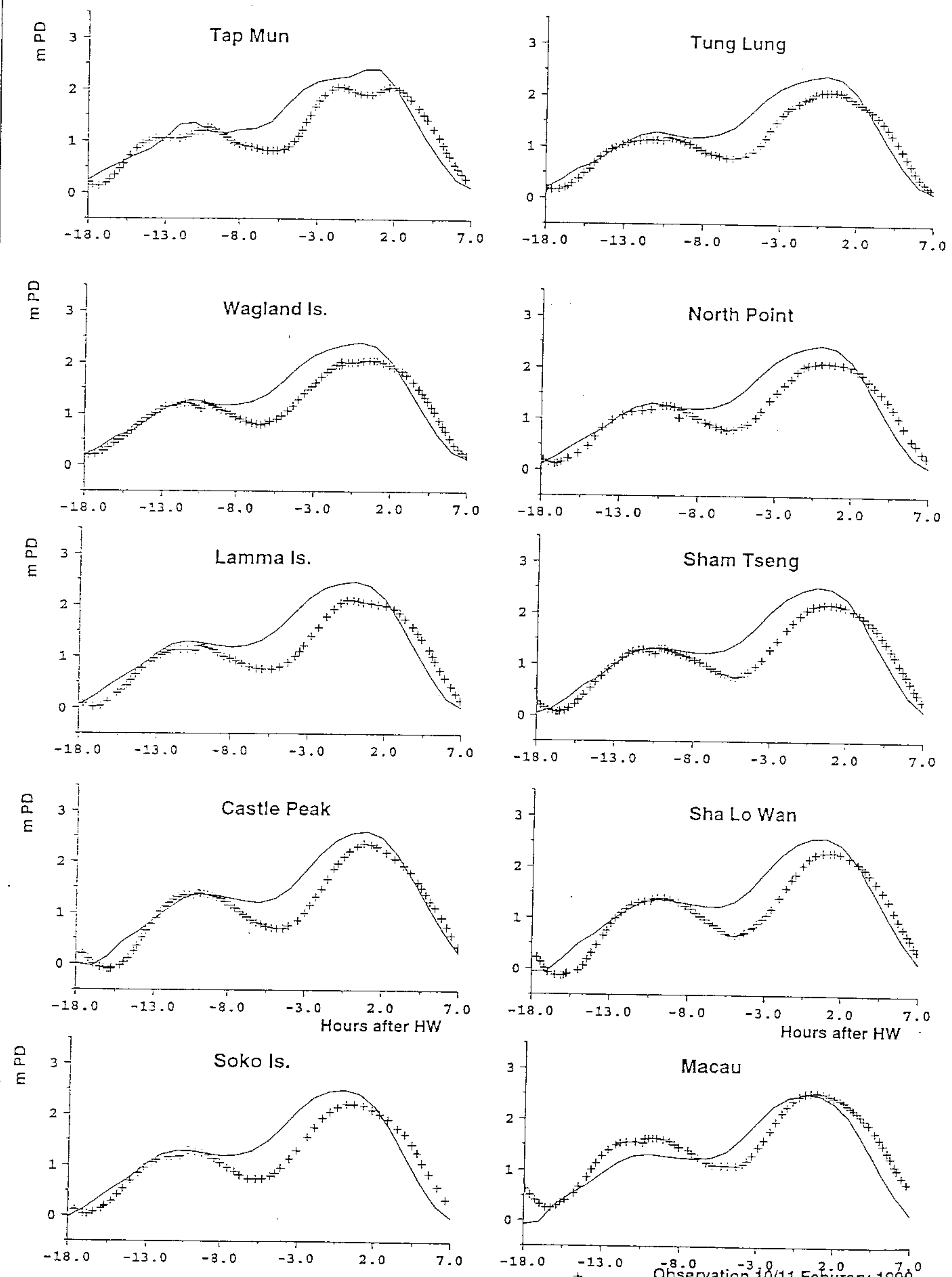



| TSUEN WAN BAY FURTHER RECLAMATION, AREA 35<br>LOCATIONS OF CURRENT METER SITES | FIGURE 4 |
|---|---|




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
DRY SEASON SPRING TIDE COMPARISON, 8-9/2/90

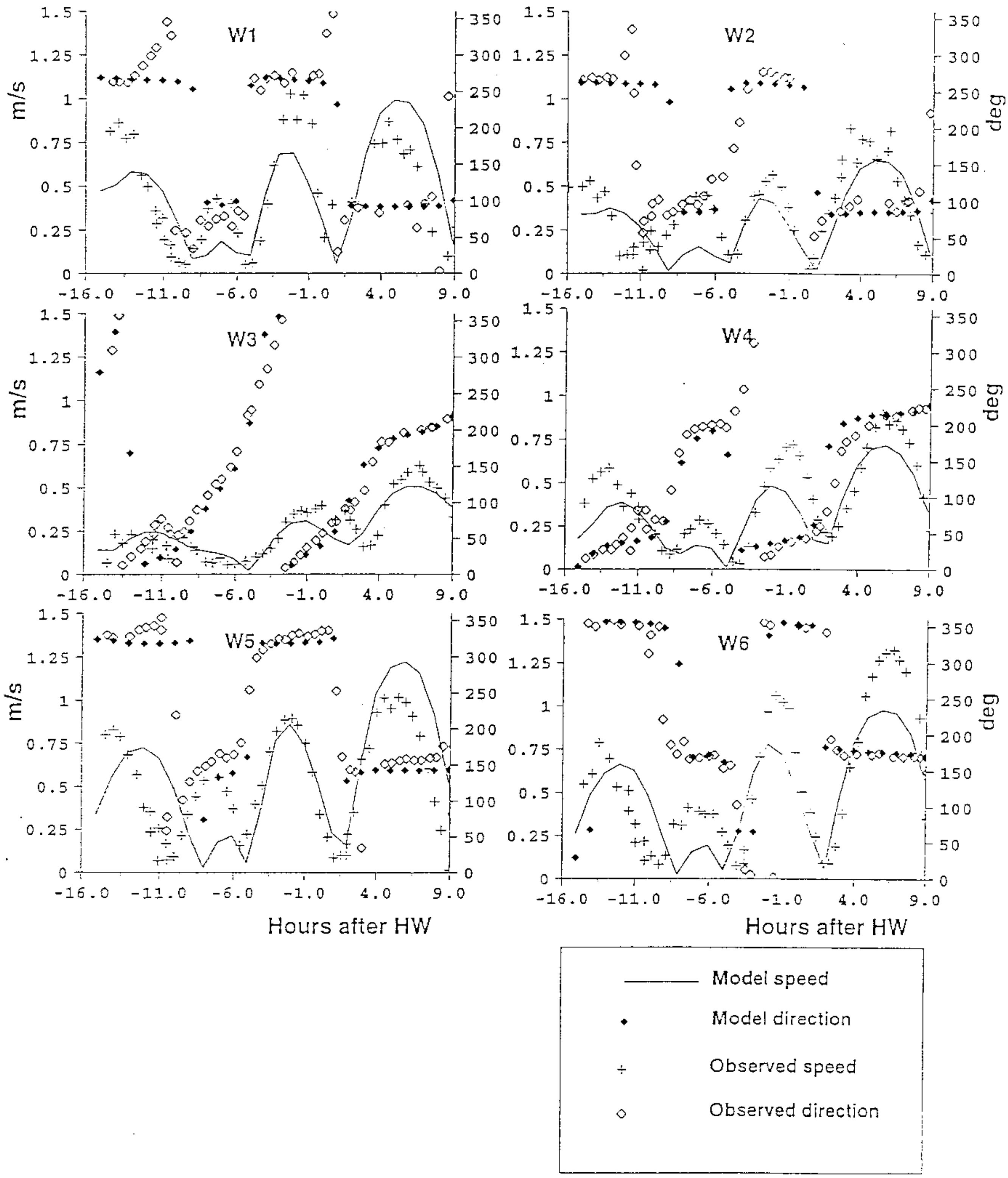
FIGURE 5




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

DRY SEASON SPRING TIDE COMPARISON, 10-11/2/90

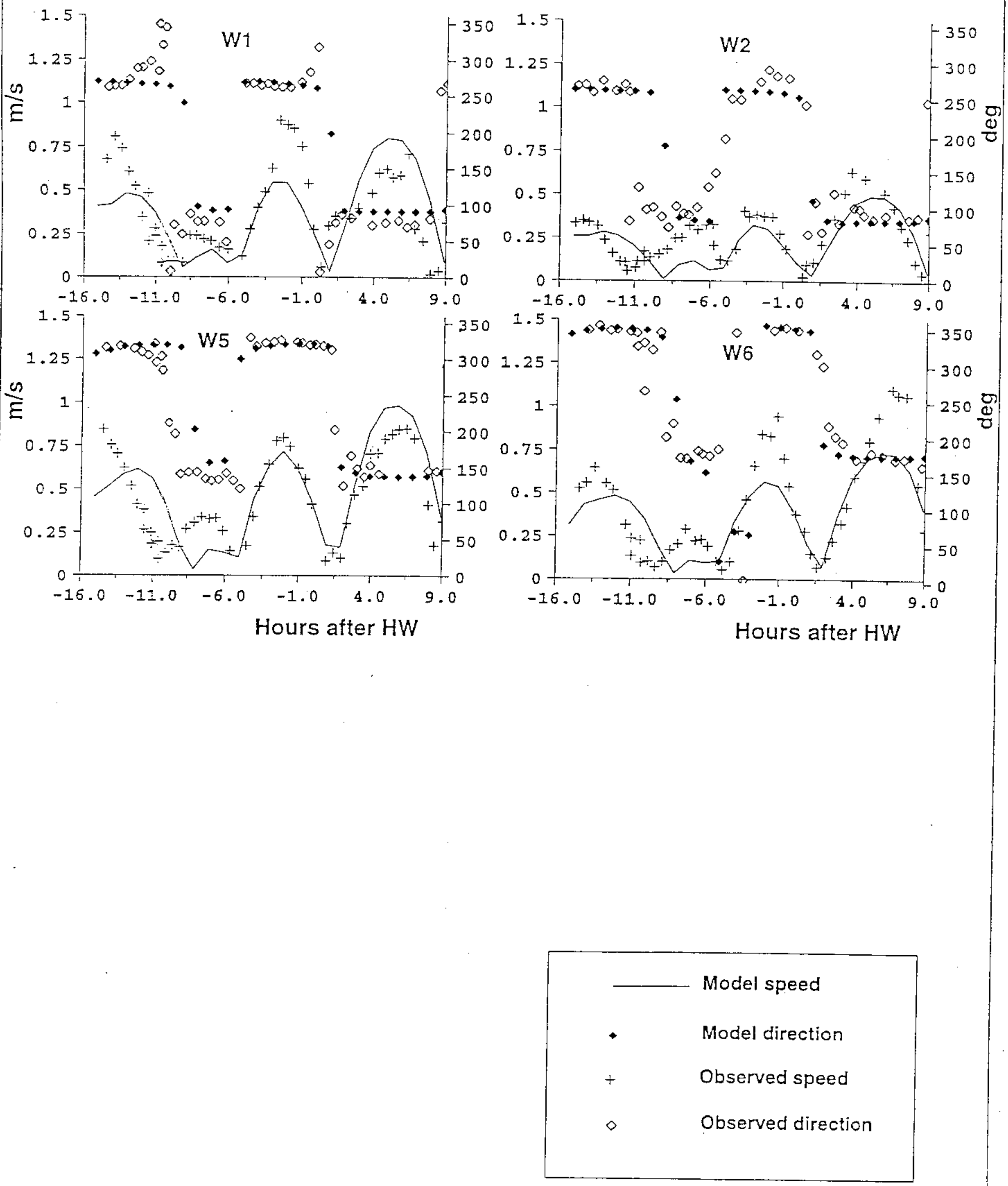
FIGURE 6




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

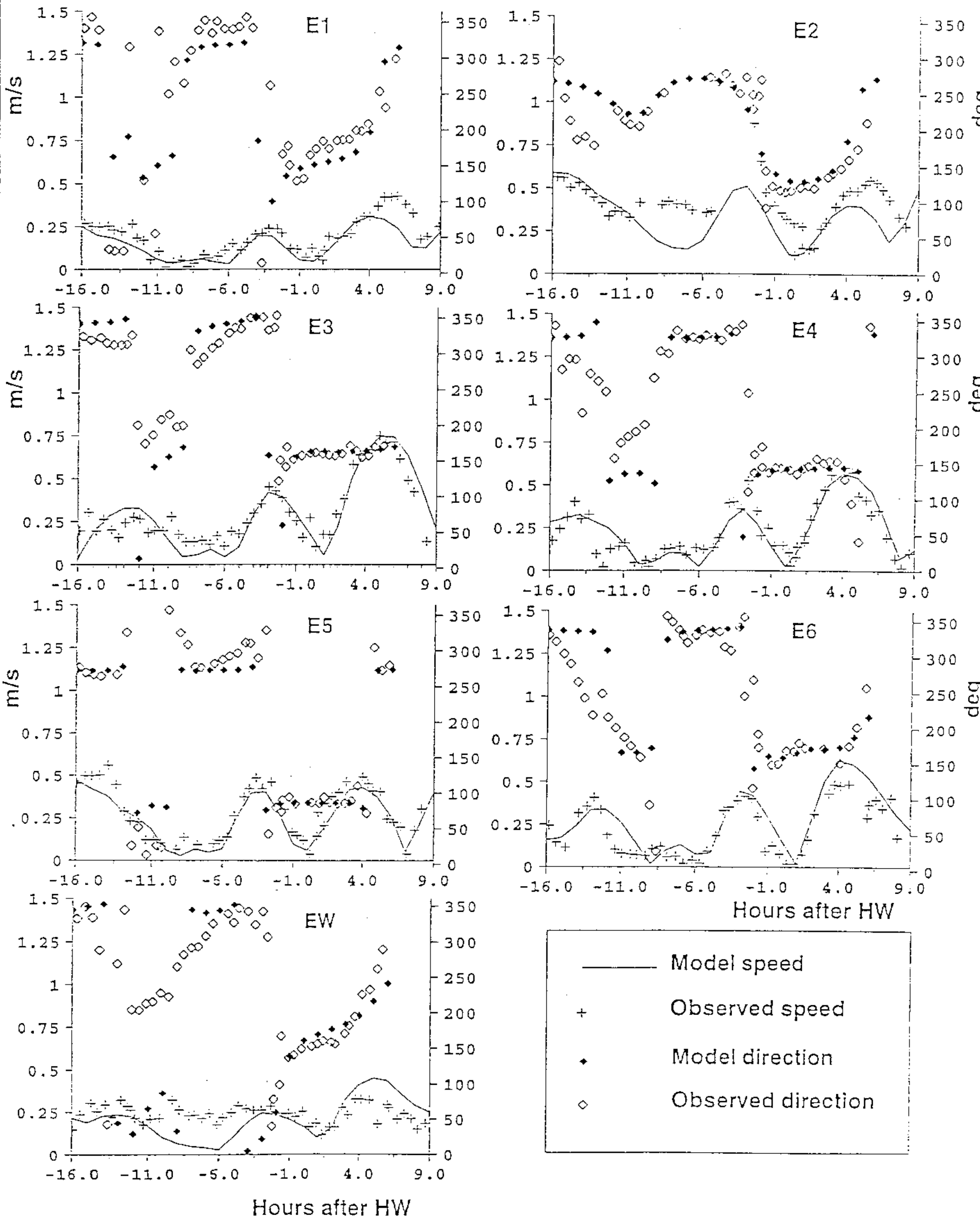
W SITES, SURFACE CURRENT COMPARISON,DRY SEASON SPRING TIDE

FIGURE 7




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
W SITES, BED CURRENT COMPARISON,DRY SEASON
SPRING TIDE

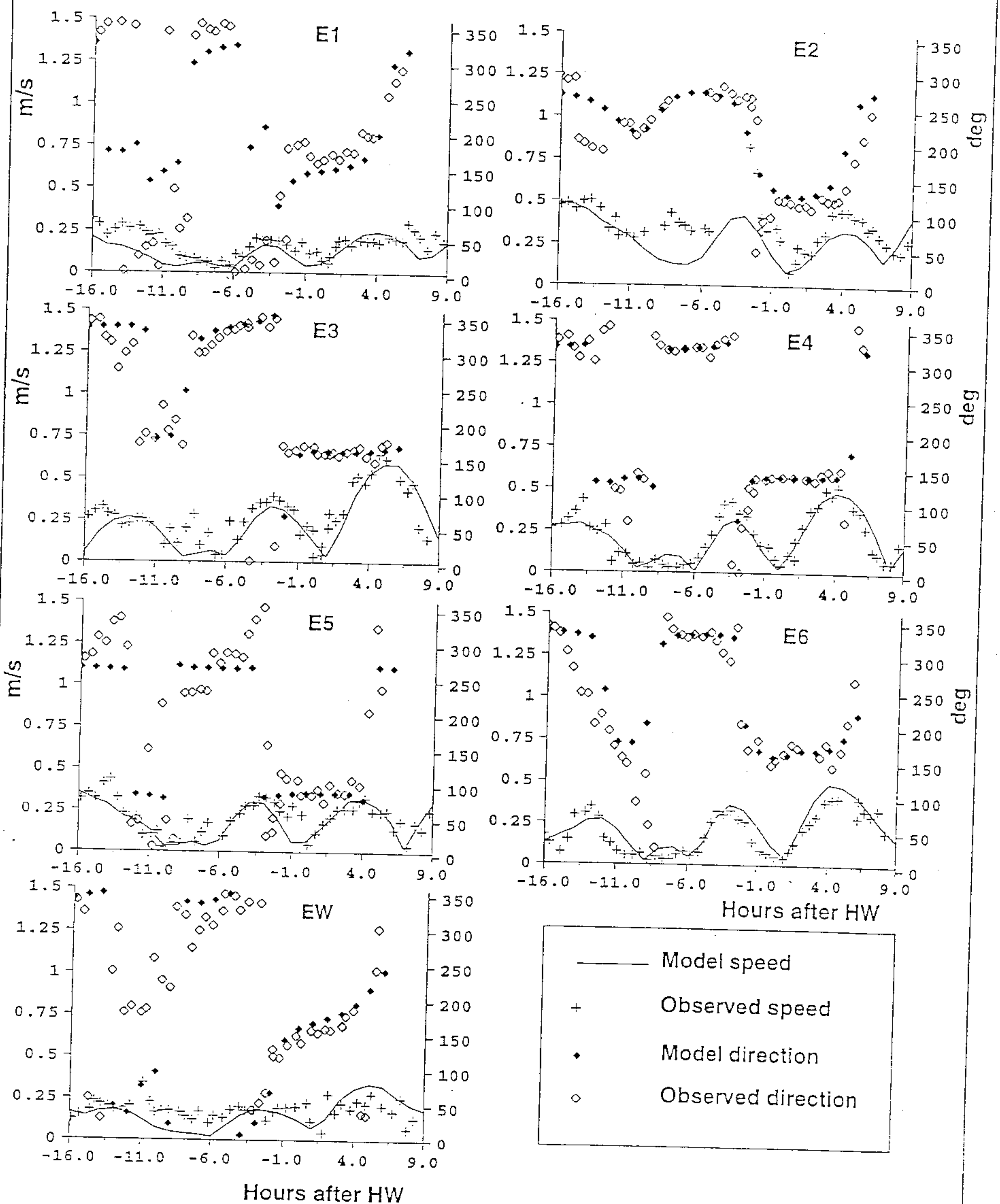
FIGURE 8




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

E SITES, SURFACE CURRENT COMPARISON,DRY SEASON SPRING TIDE

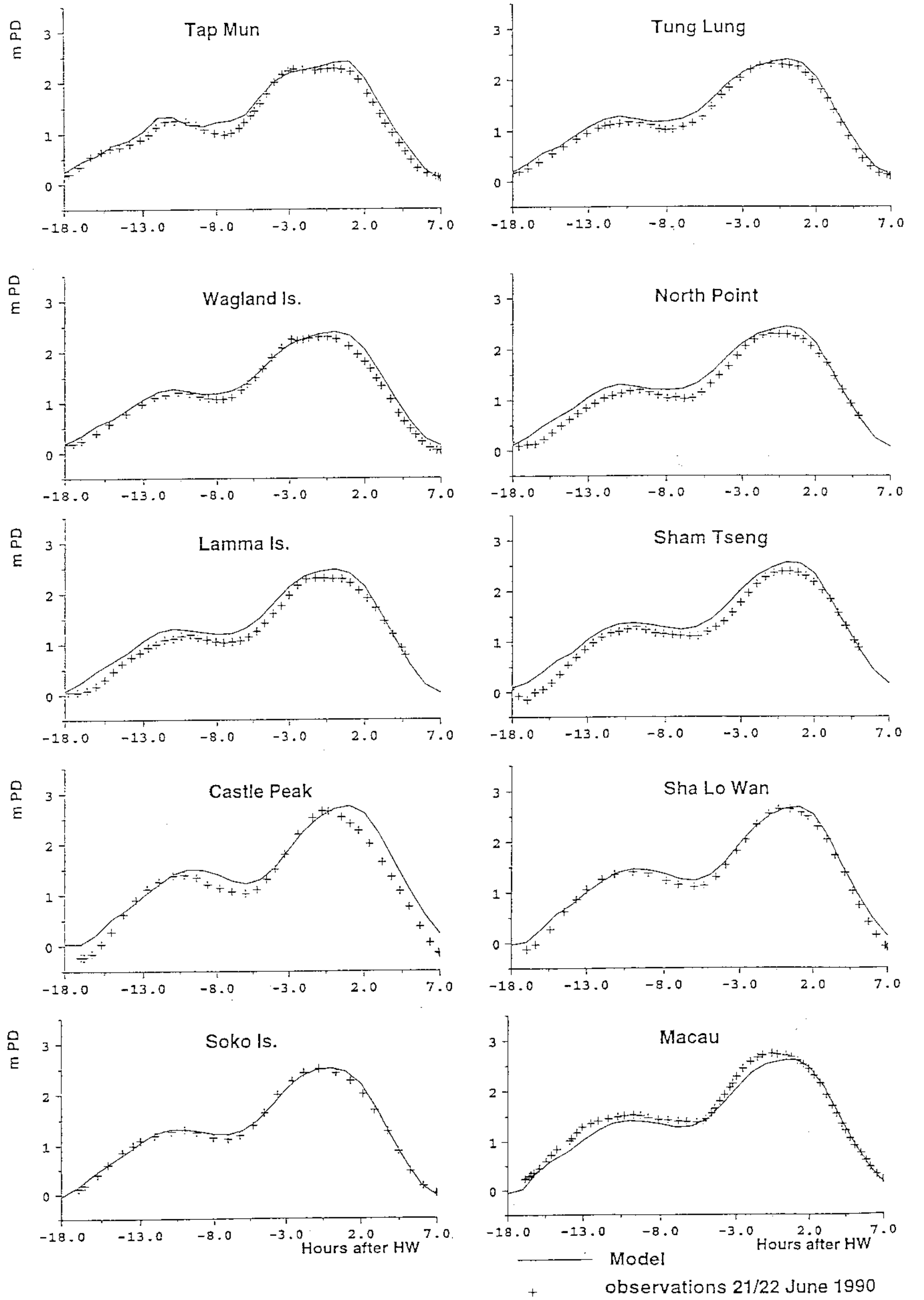
FIGURE 9




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

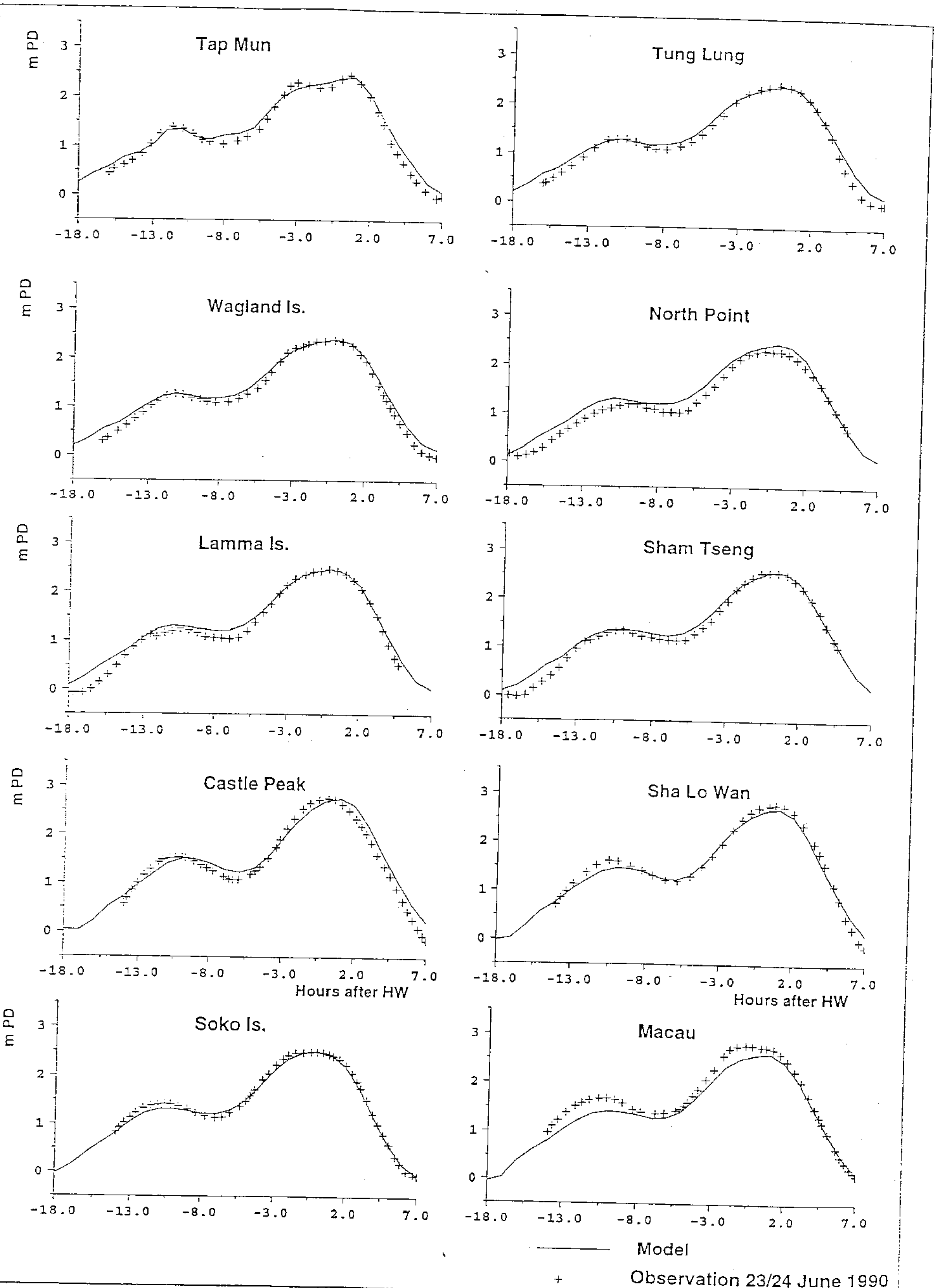
E SITES, BED CURRENT COMPARISON,DRY SEASON SPRING TIDE

FIGURE 10



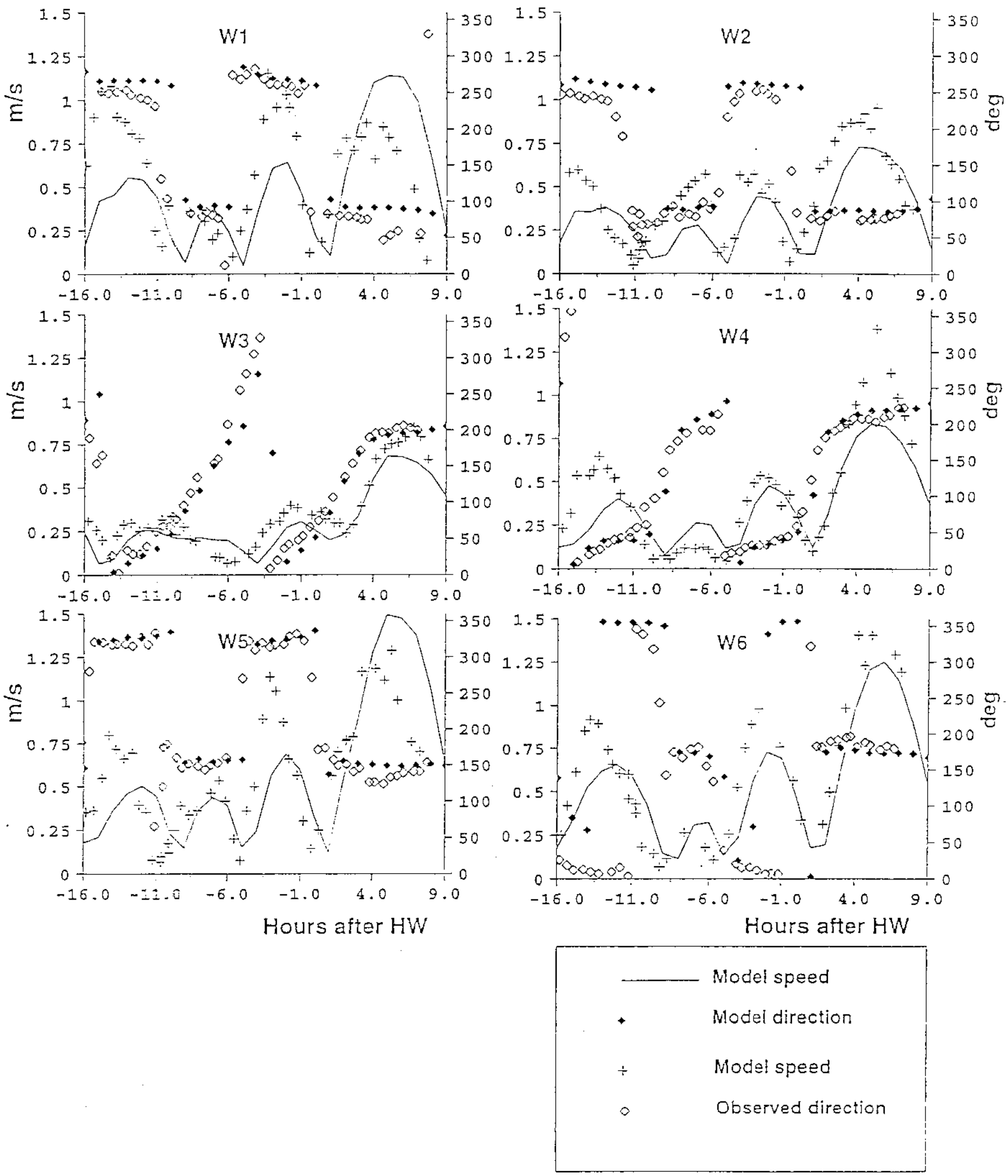

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
WET SEASON SPRING TIDE COMPARISON, 21-22/2/90

FIGURE 11




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
WET SEASON SPRING TIDE COMPARISON, 23-24/2/90

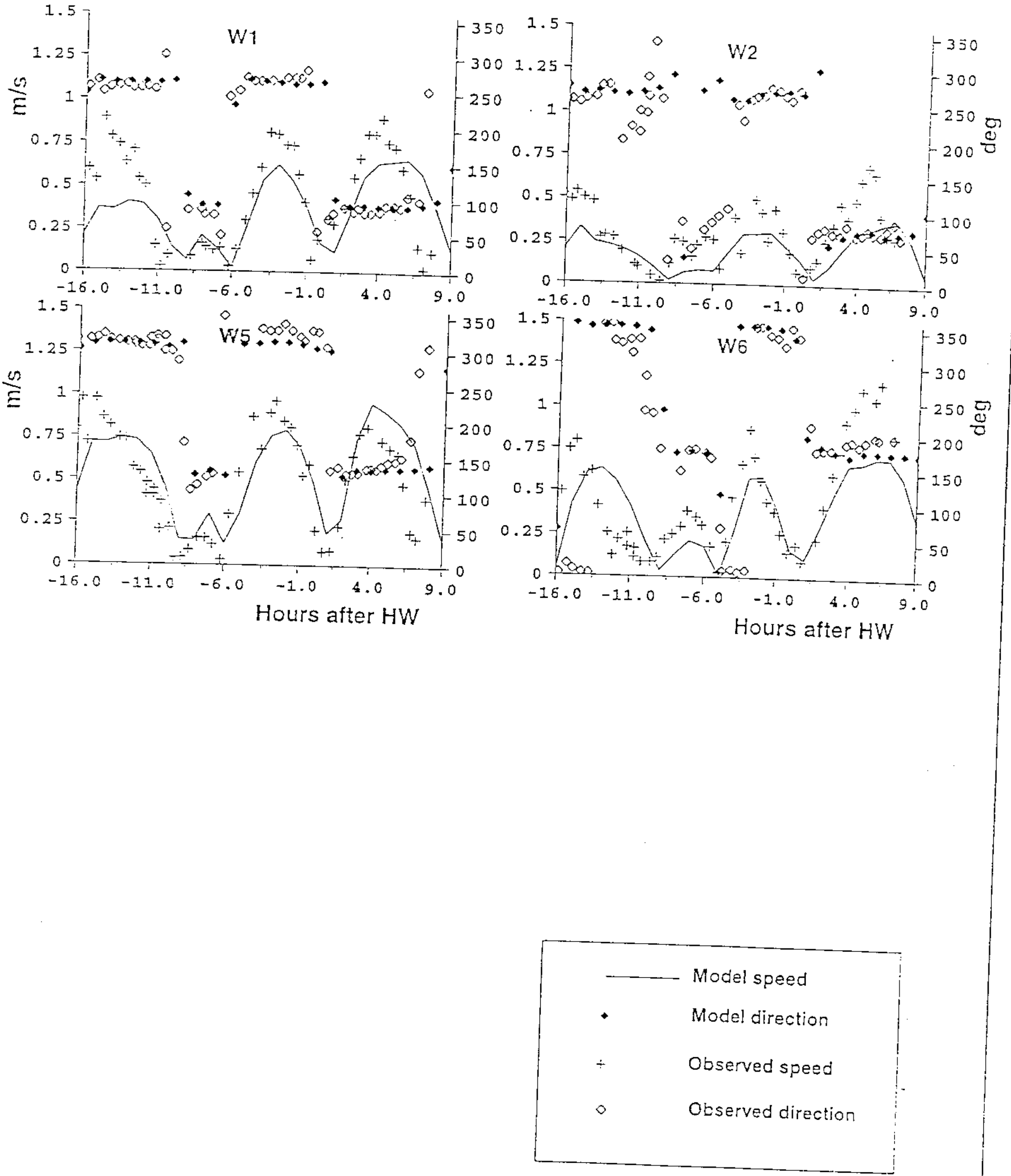
FIGURE 12



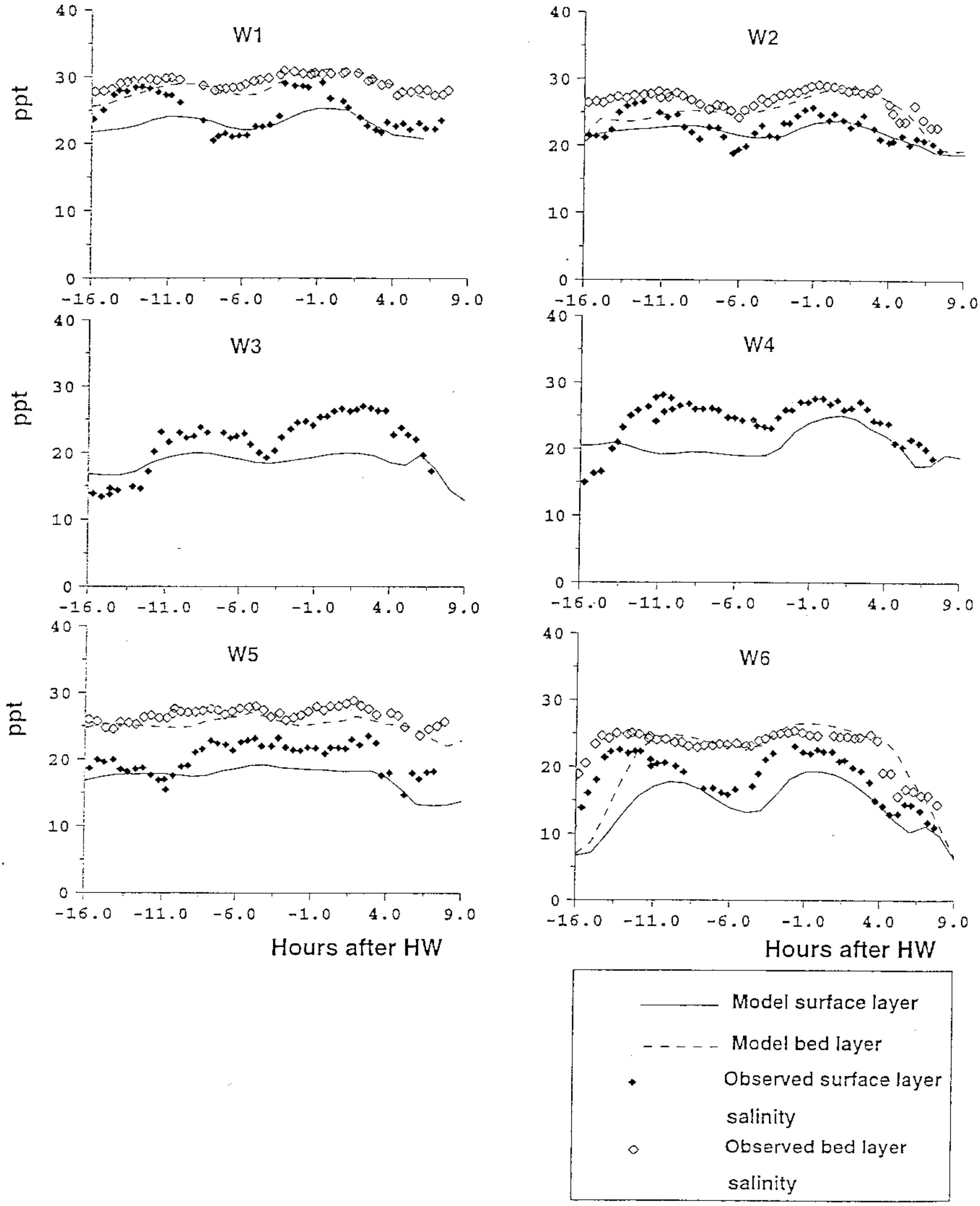

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

W SITES, SURFACE CURRENT COMPARISON, WET SEASON SPRING TIDE

FIGURE 13



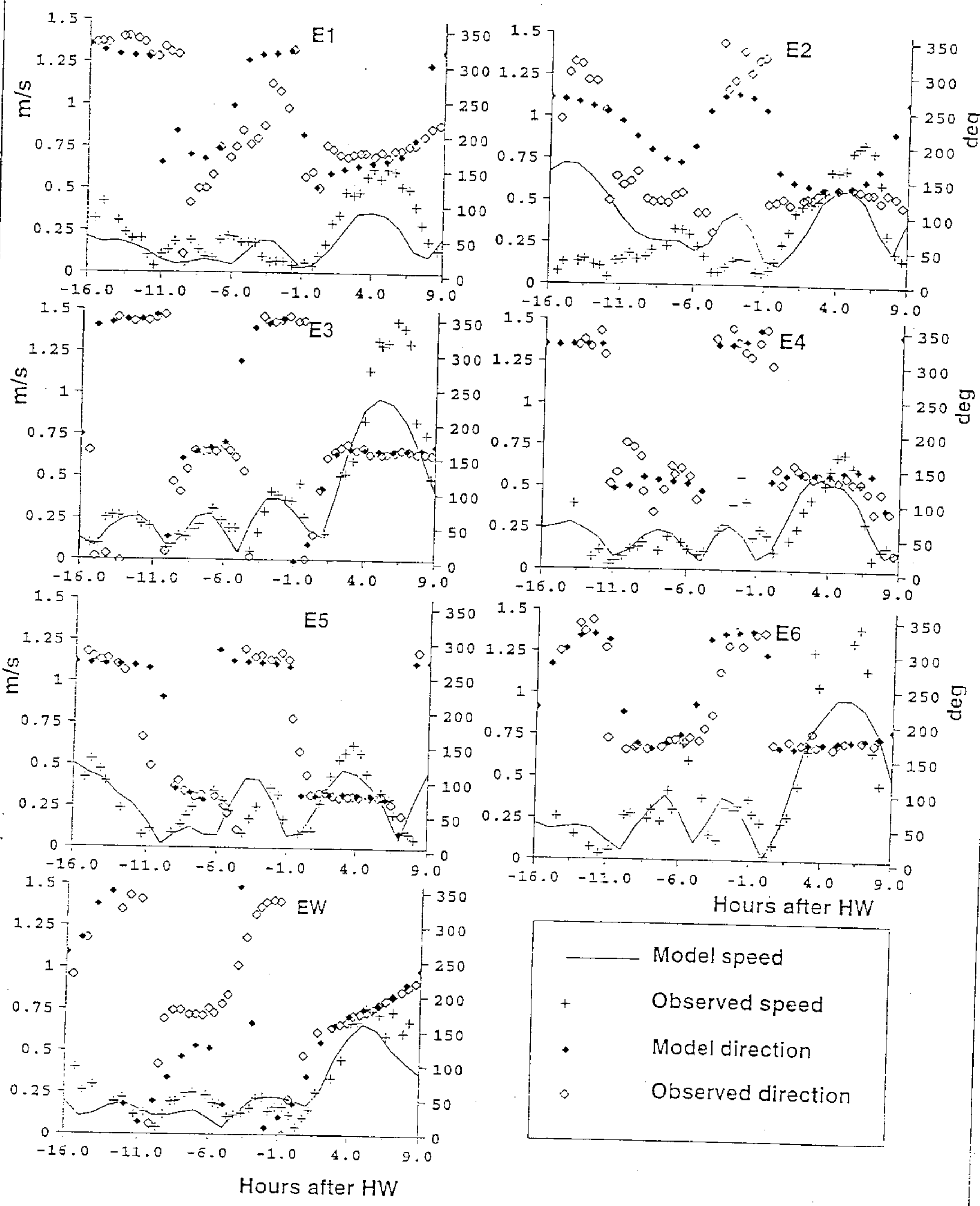

| TSUEN WAN BAY FURTHER RECLAMATION, AREA 35<br>W SITES, BED CURRENT COMPARISON, WET SEASON<br>SPRING TIDE | FIGURE 14 |
| --- | --- |




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

W SITES, SALINITY COMPARISON, WET SEASON SPRING TIDE

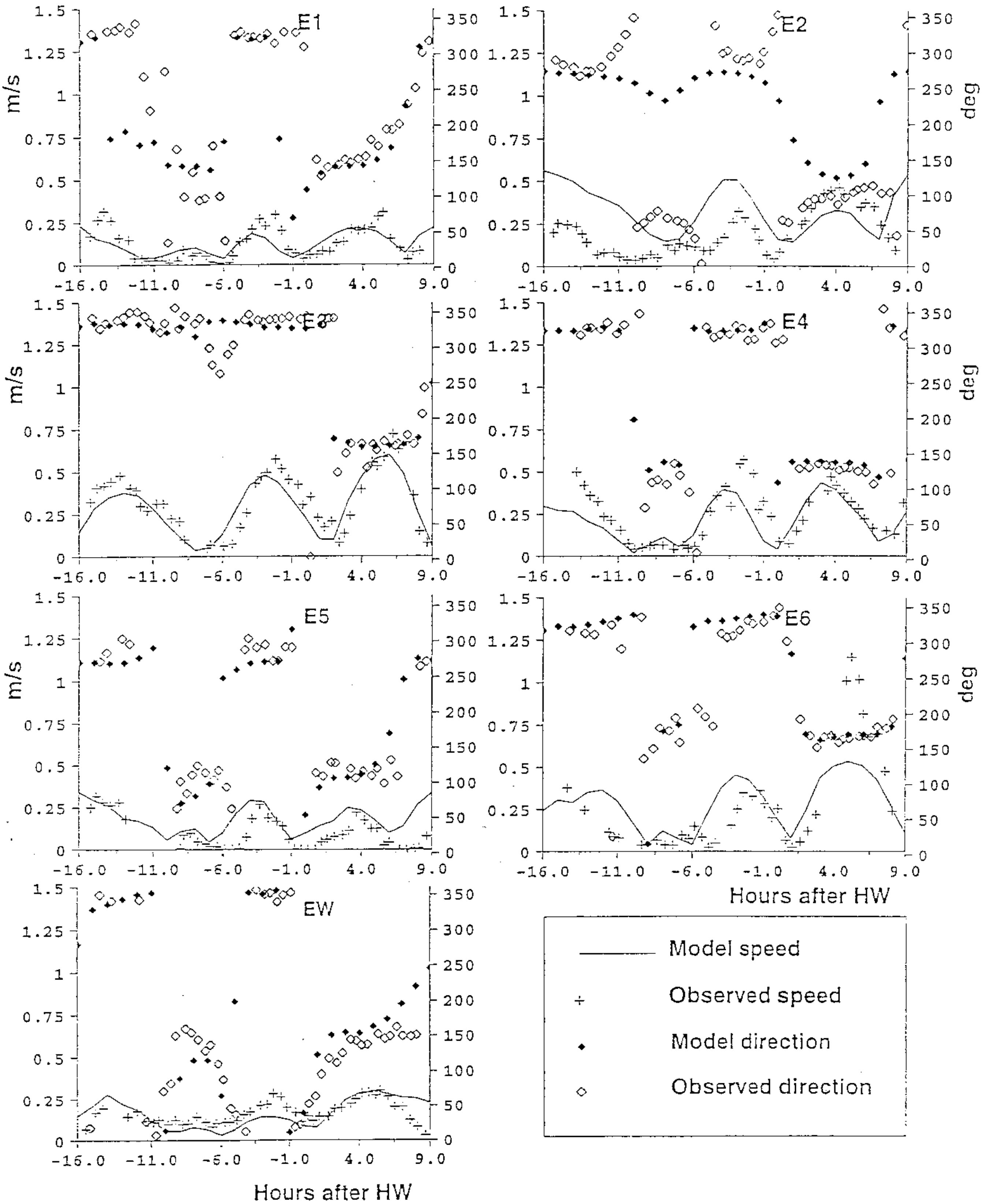
FIGURE 15




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

E SITES, SURFACE CURRENT COMPARISON,WET SEASON SPRING TIDE

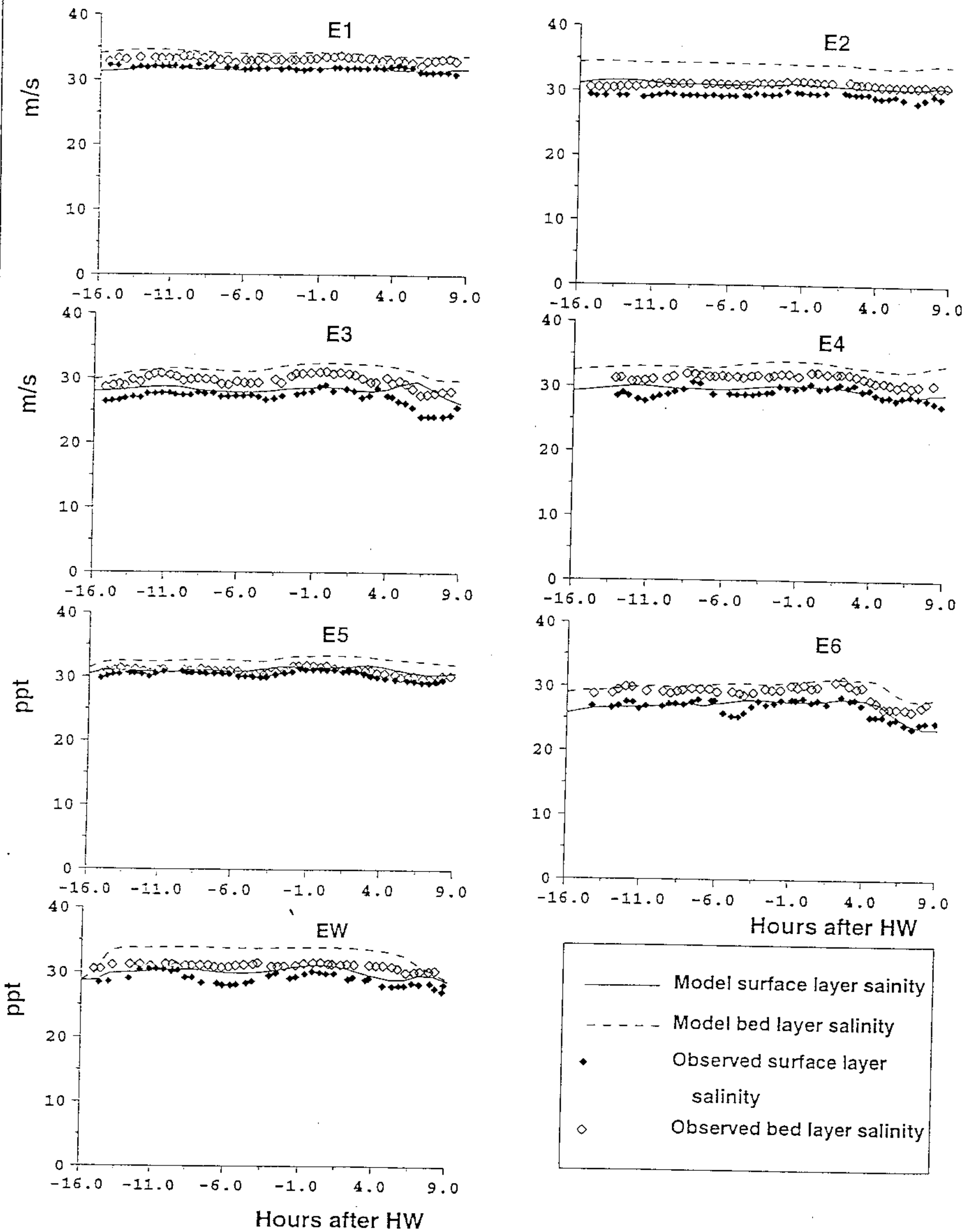
FIGURE 16




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

E SITES, BED CURRENT COMPARISON, WET SEASON SPRING TIDE

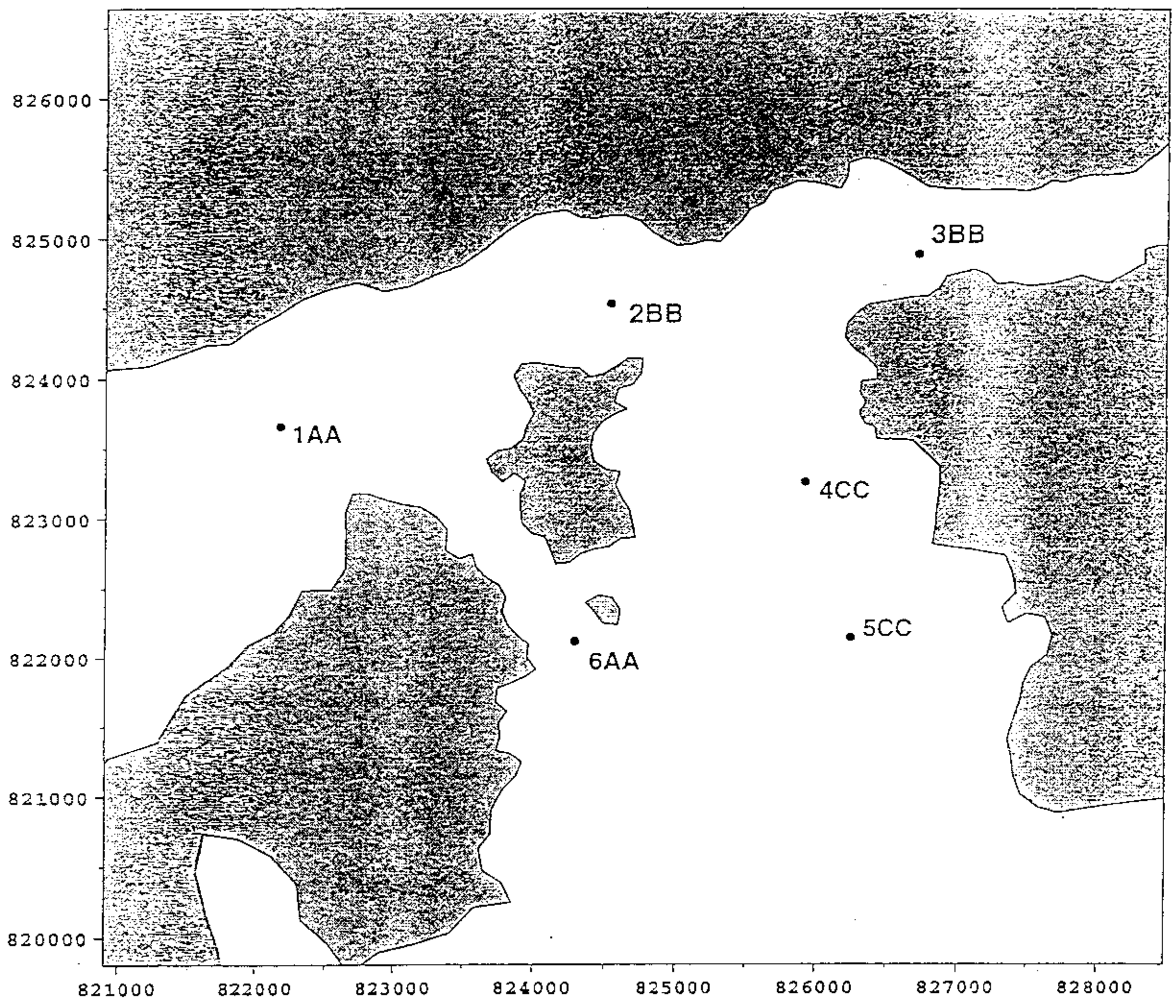
FIGURE 17



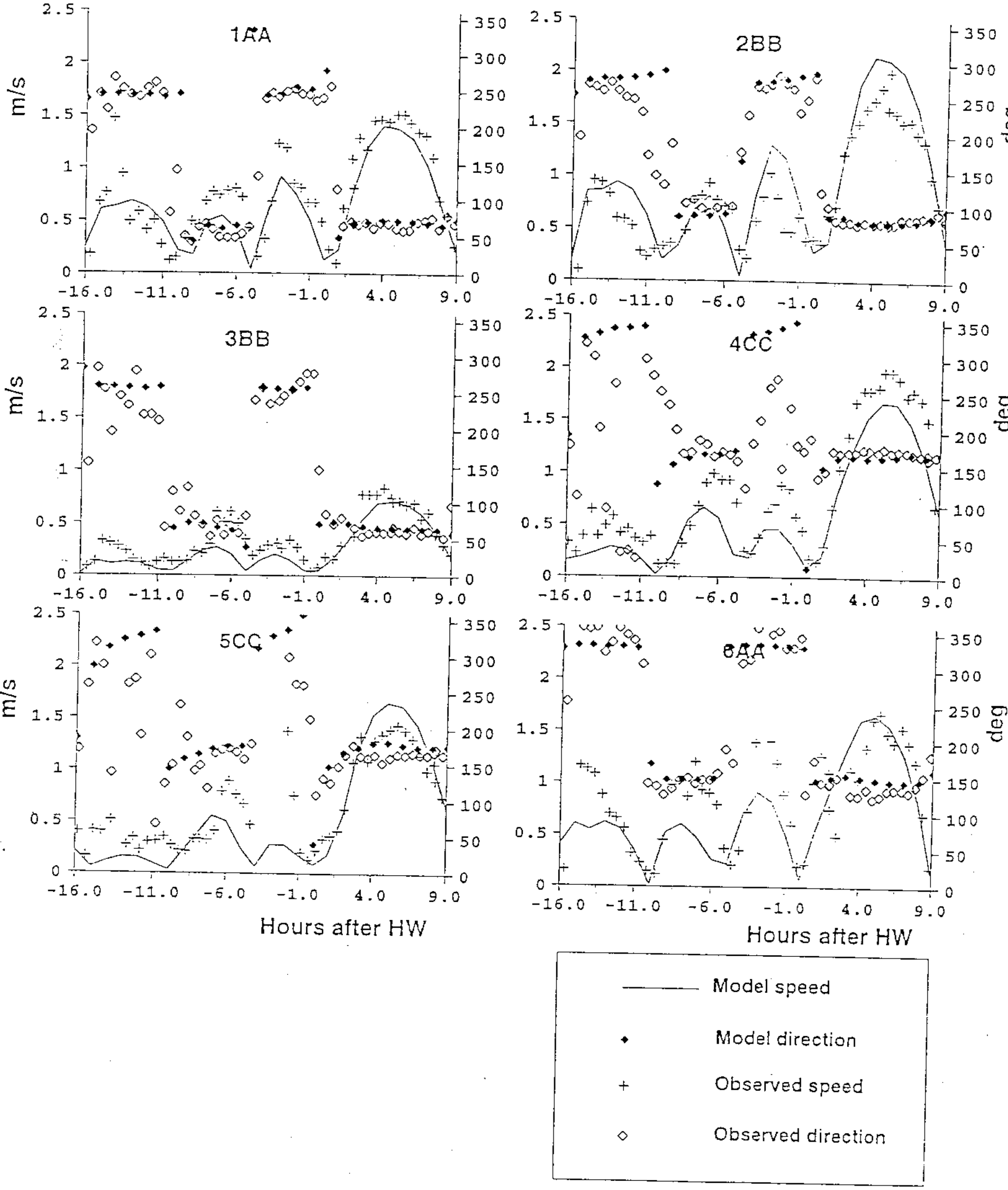

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

E SITES, SALINITY COMPARISON, WET SEASON SPRING TIDE

FIGURE 18



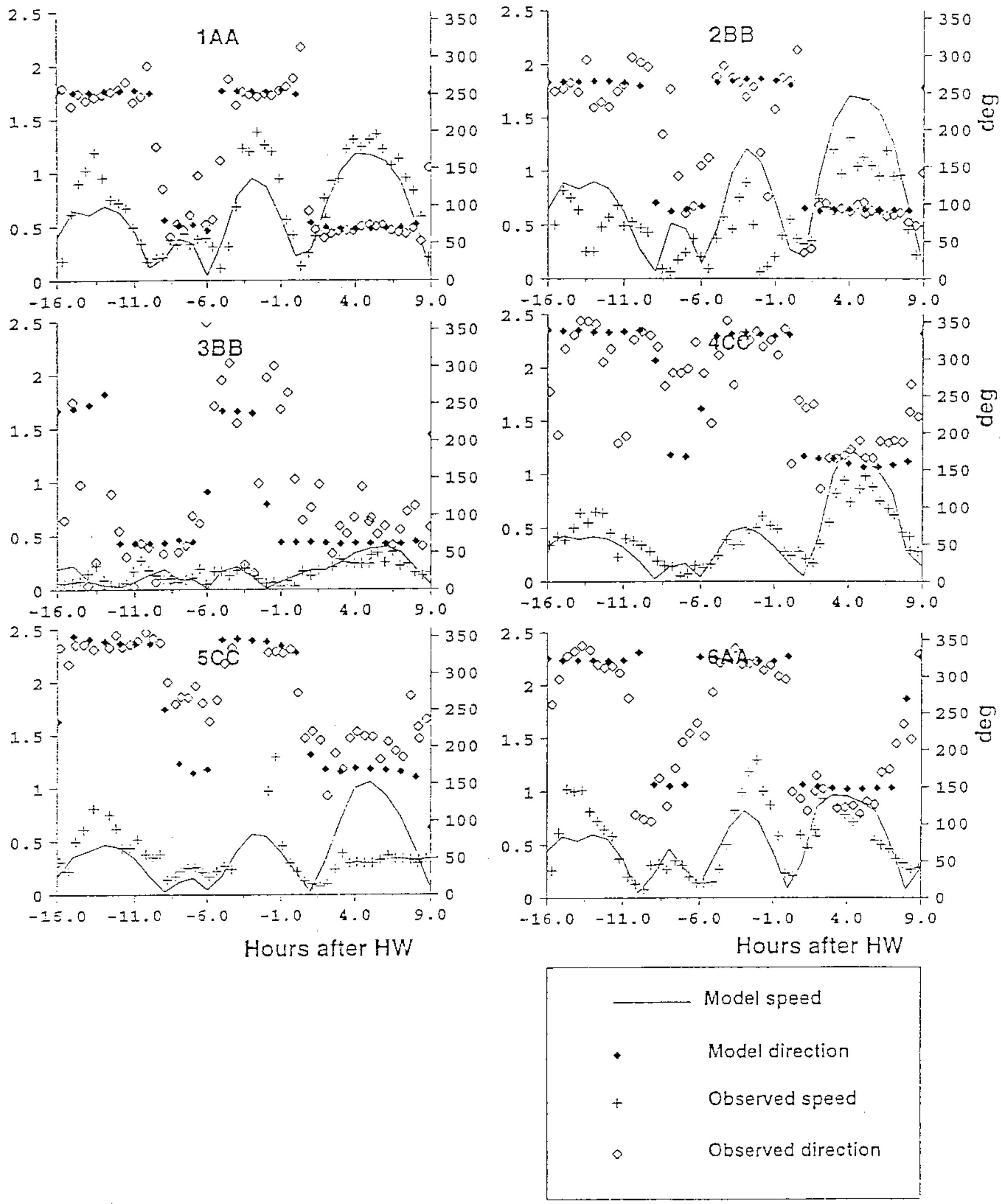

| TSUEN WAN BAY FURTHER RECLAMATION, AREA 35<br>BMT OBSERVATION LOCATIONS, 22-25/6/86 | FIGURE 19 |
| --- | --- |



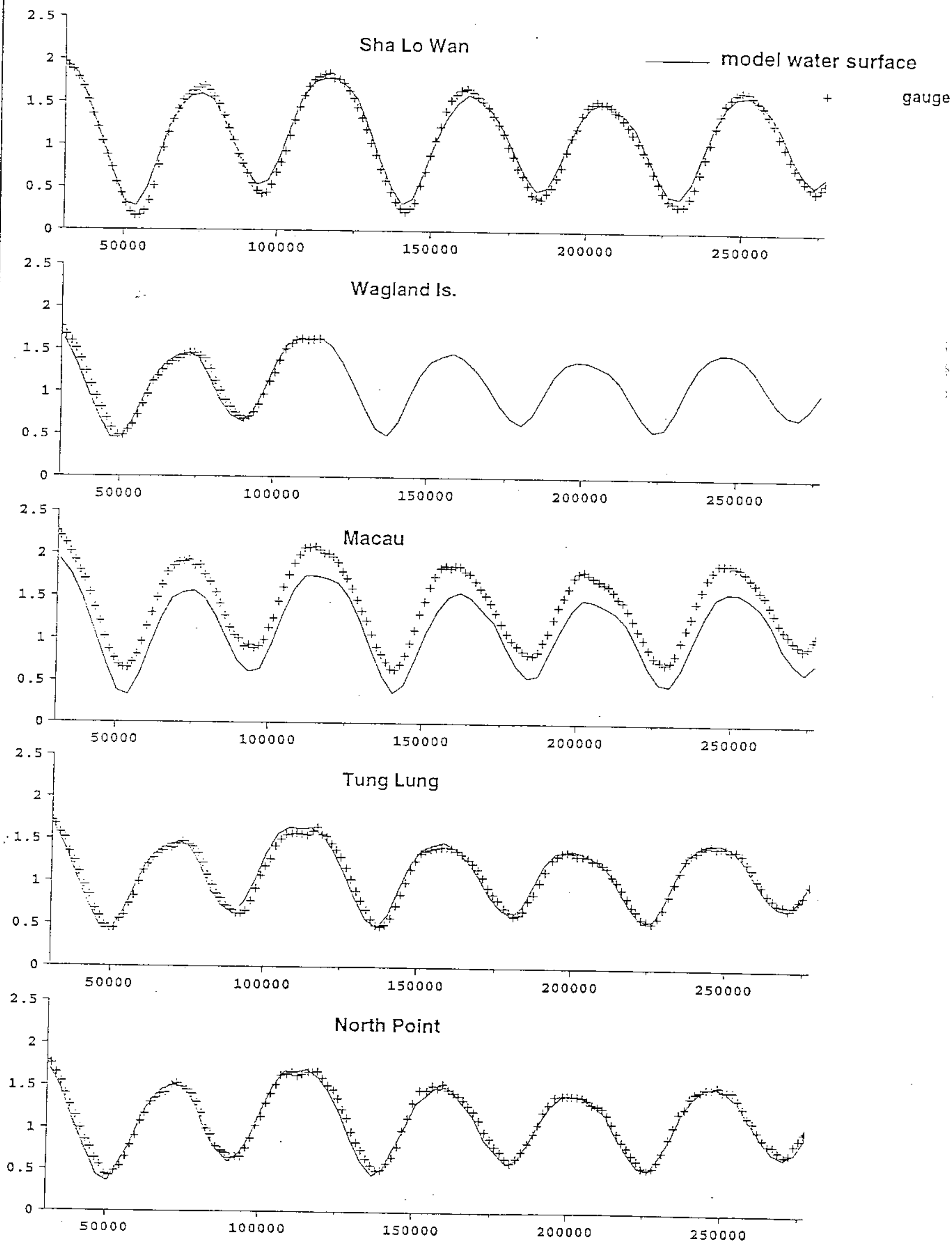

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

BMT SITES, SURFACE CURRENT COMPARISON, WET SEASON SPRING TIDE

FIGURE 20

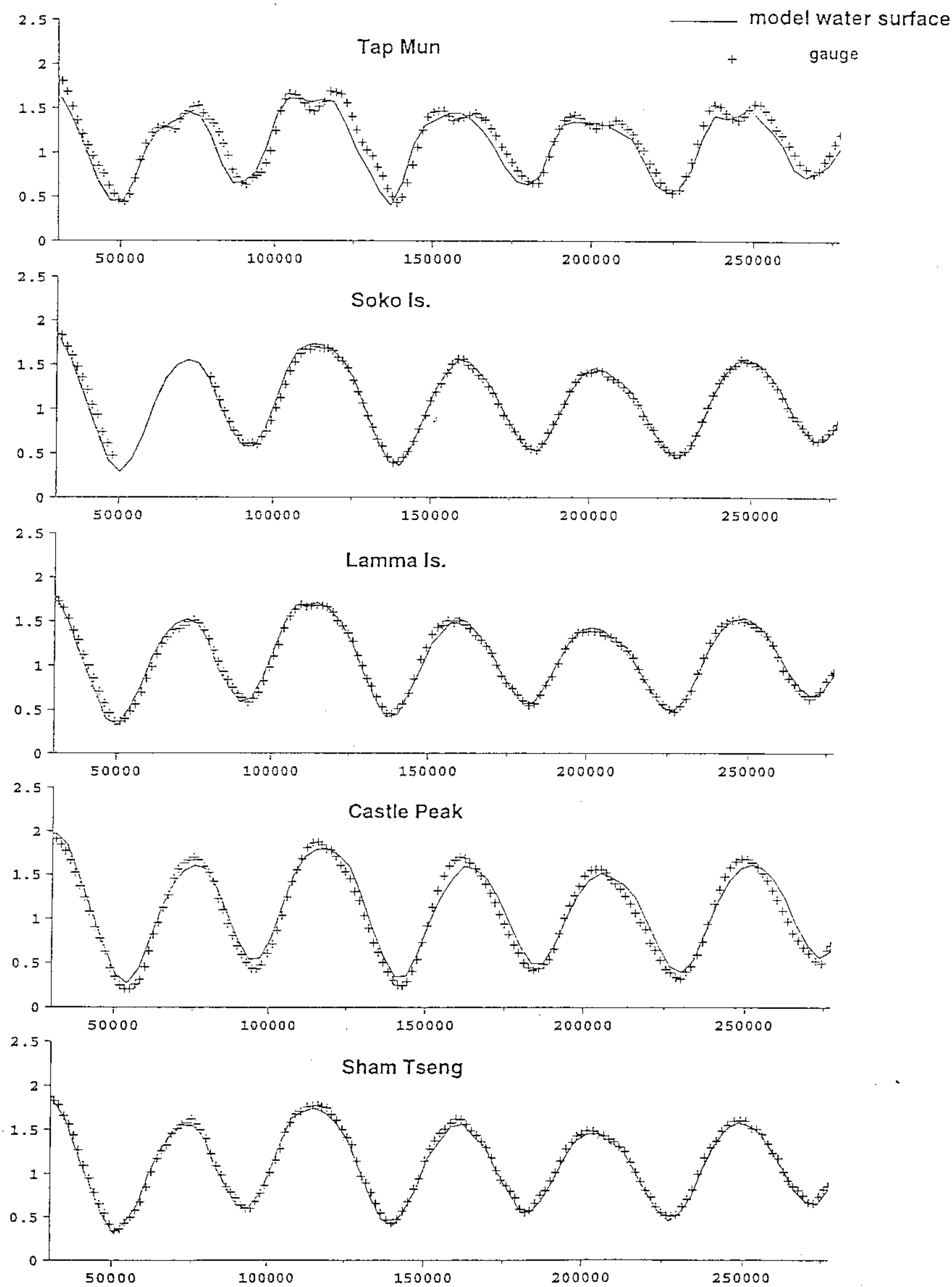



| TSUEN WAN BAY FURTHER RECLAMATION, AREA 35<br>BMT SITES, BED CURRENT COMPARISON, WET SEASON<br>SPRING TIDE | FIGURE 21 |
|---|---|



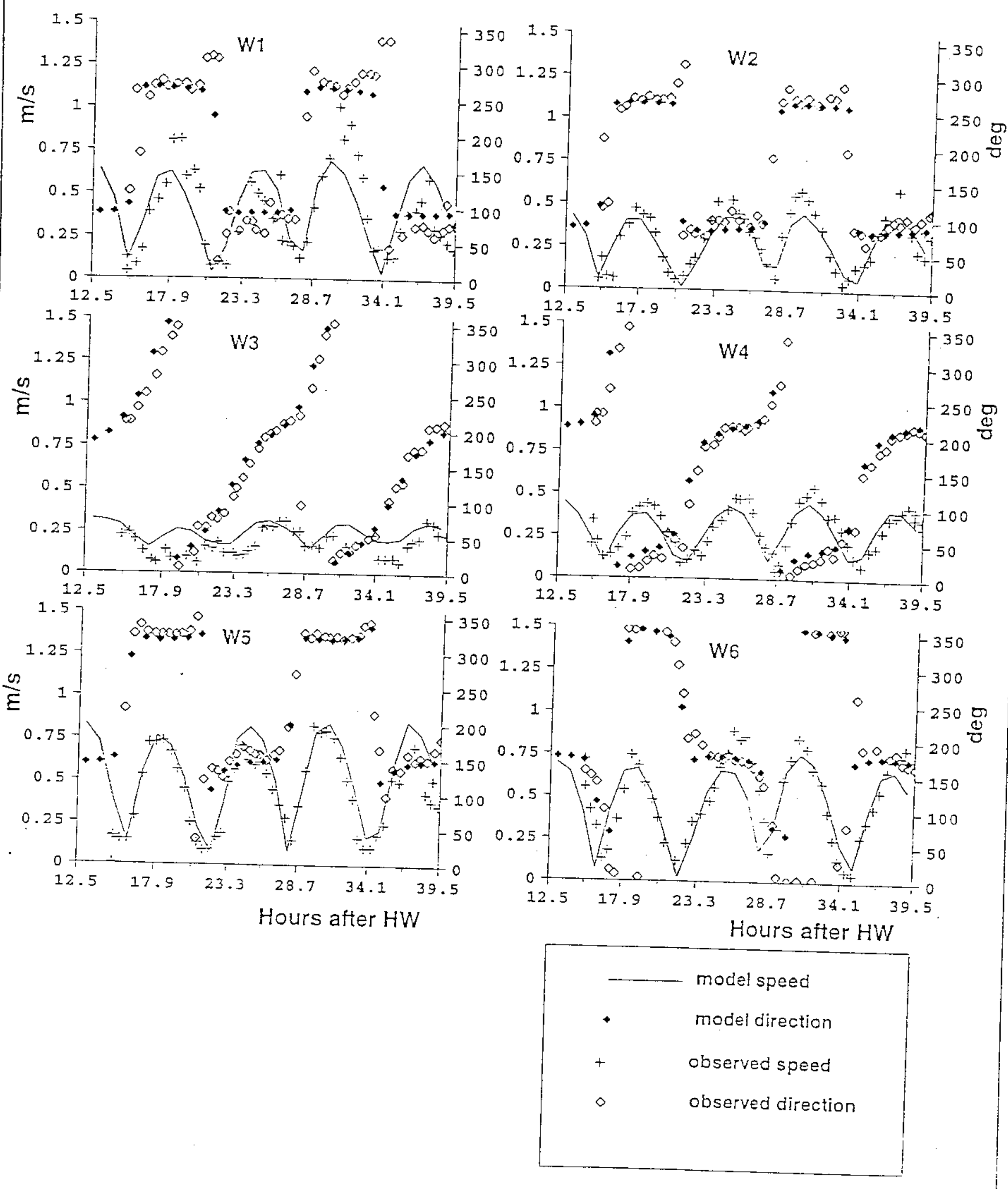

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
DRY SEASON NEAP TIDE COMPARISON

FIGURE 22




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
DRY SEASON NEAP TIDE COMPARISON

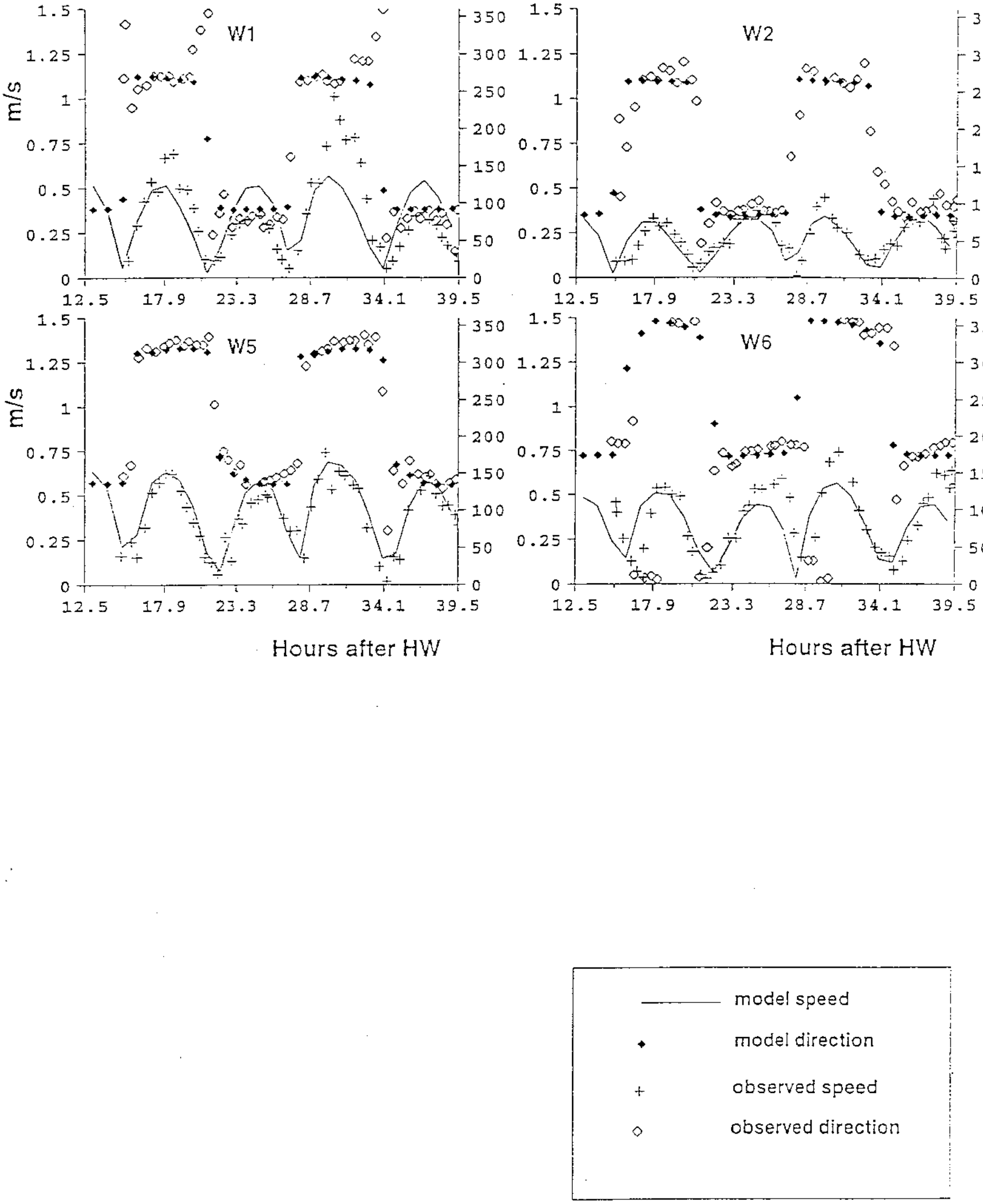
FIGURE 23




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

W SITES, SURFACE CURRENT COMPARISON,DRY SEASON NEAP TIDE

FIGURE 24

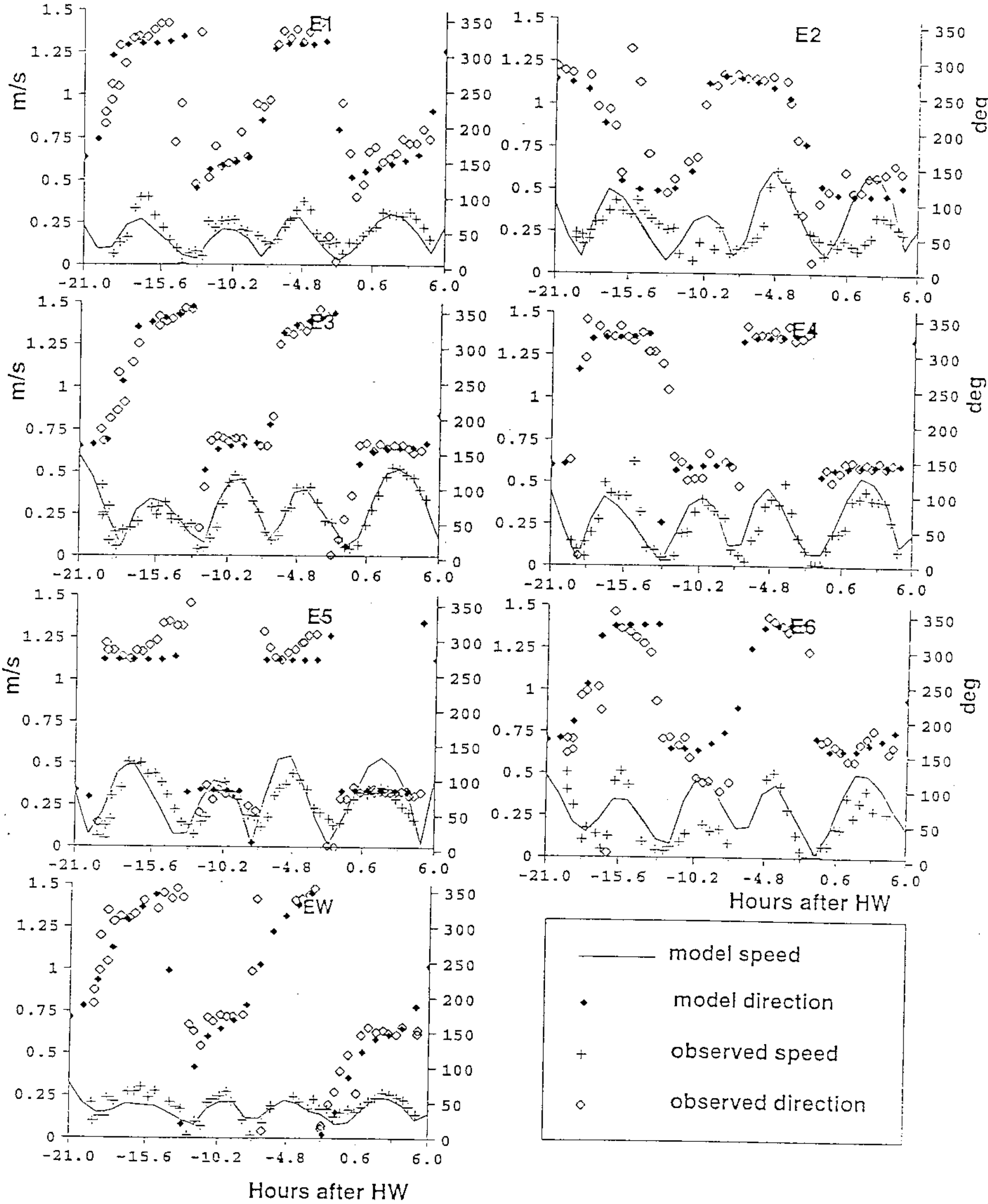



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

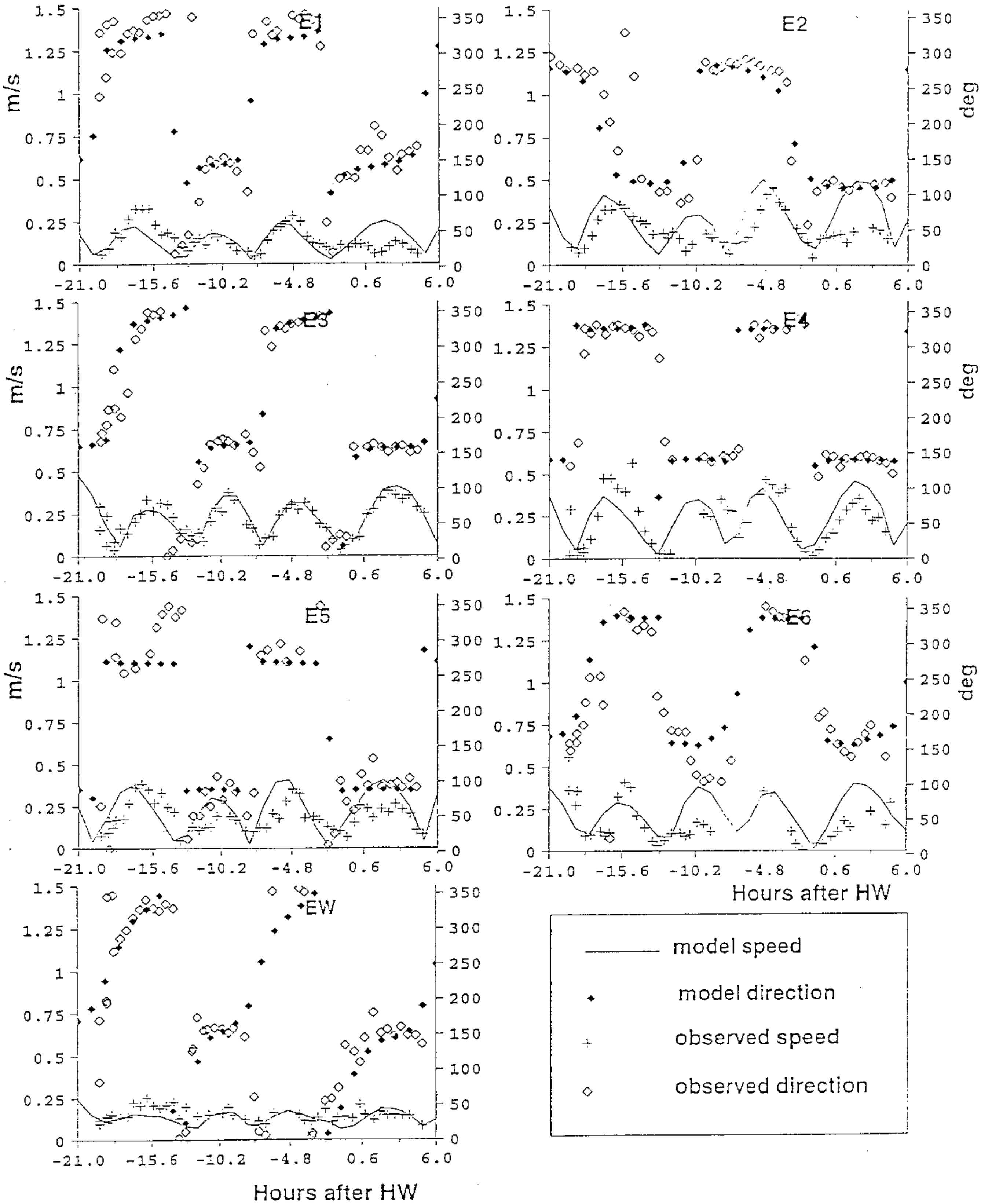
W SITES, BED CURRENT COMPARISON,DRY SEASON

NEAP TIDE

FIGURE 25



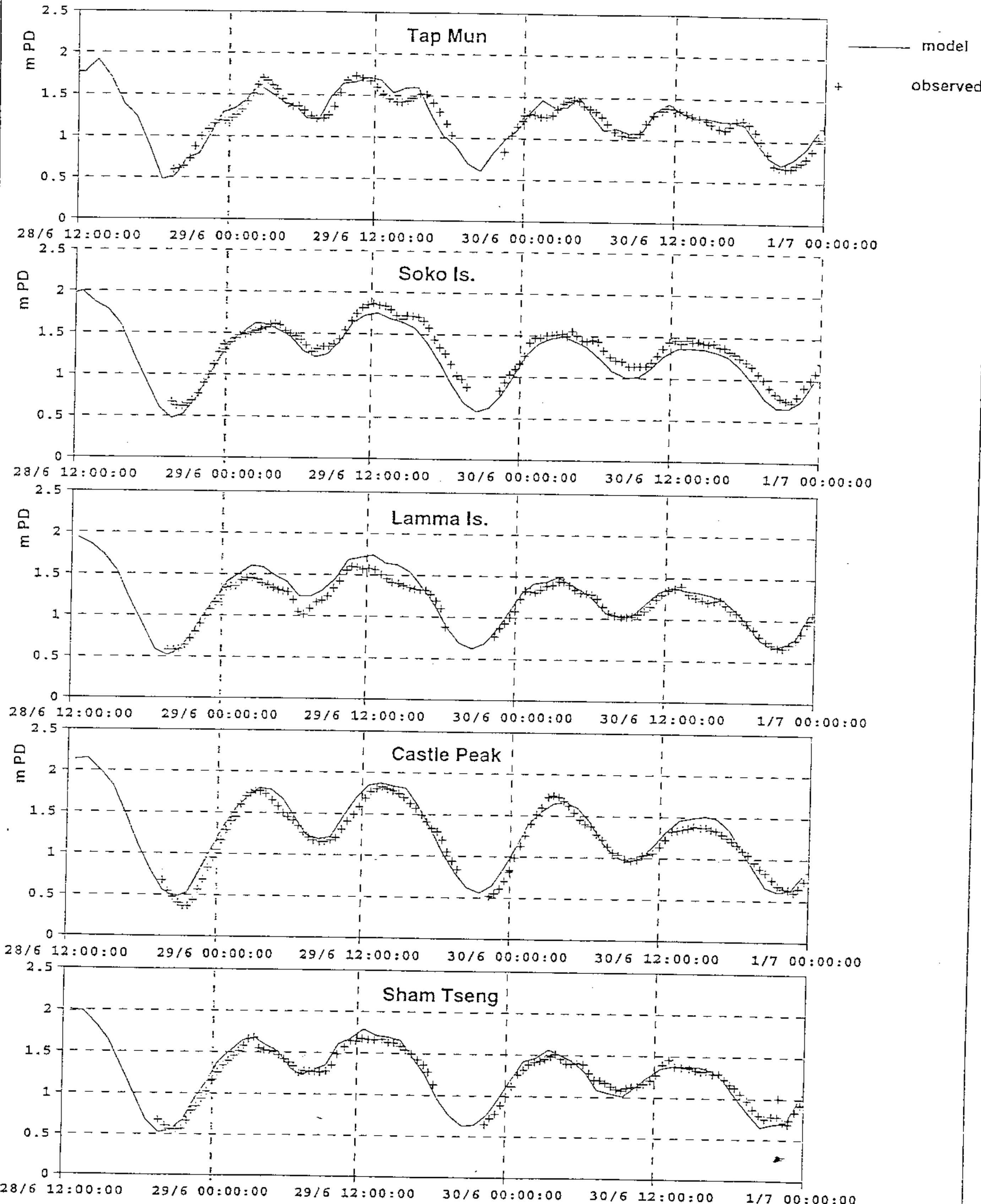

| TSUEN WAN BAY FURTHER RECLAMATION, AREA 35<br>E SITES, SURFACE CURRENT COMPARISON,DRY SEASON<br>NEAP TIDE | FIGURE 26 |
| --- | --- |



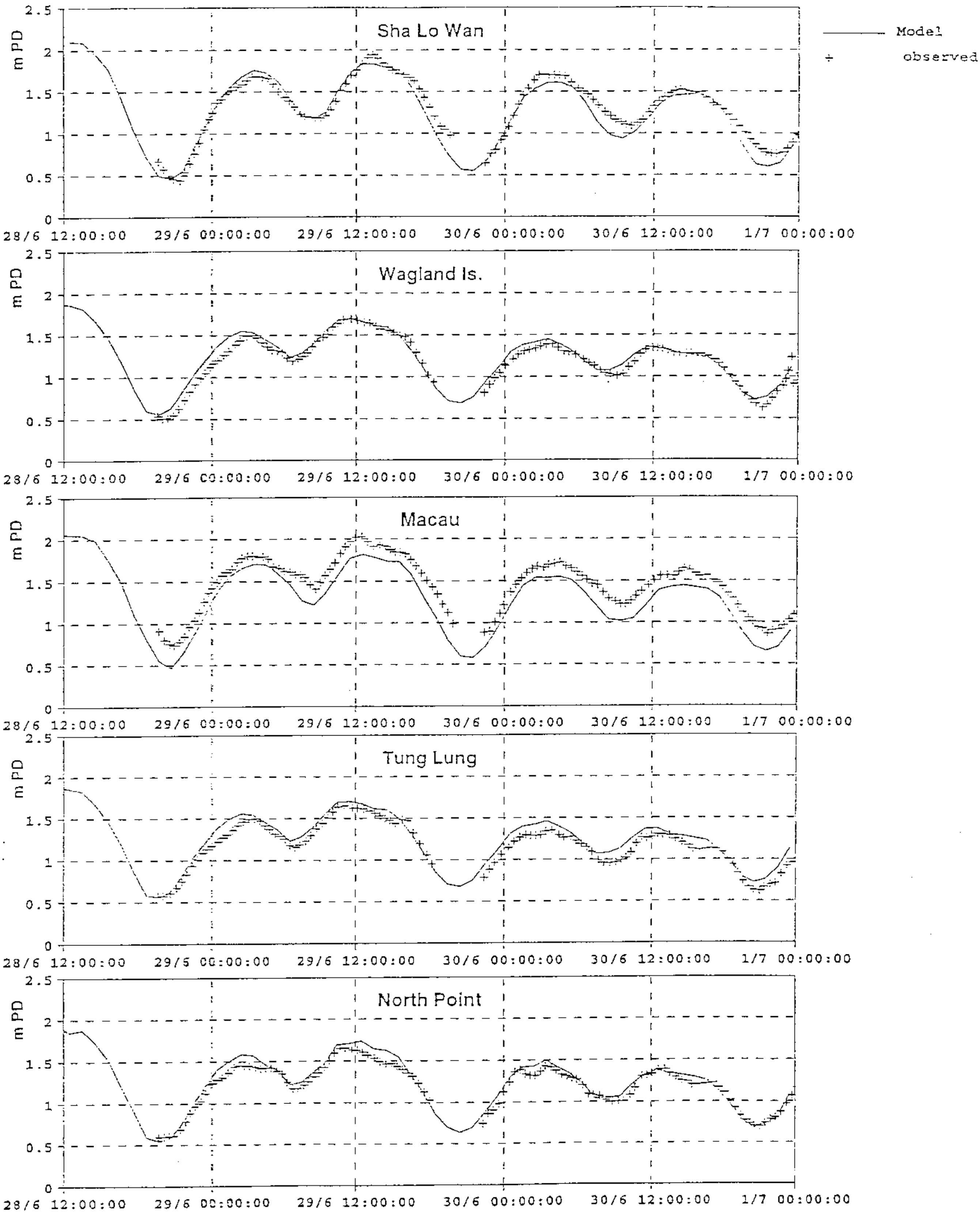

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

E SITES, BED CURRENT COMPARISON,DRY SEASON NEAP TIDE

FIGURE 27

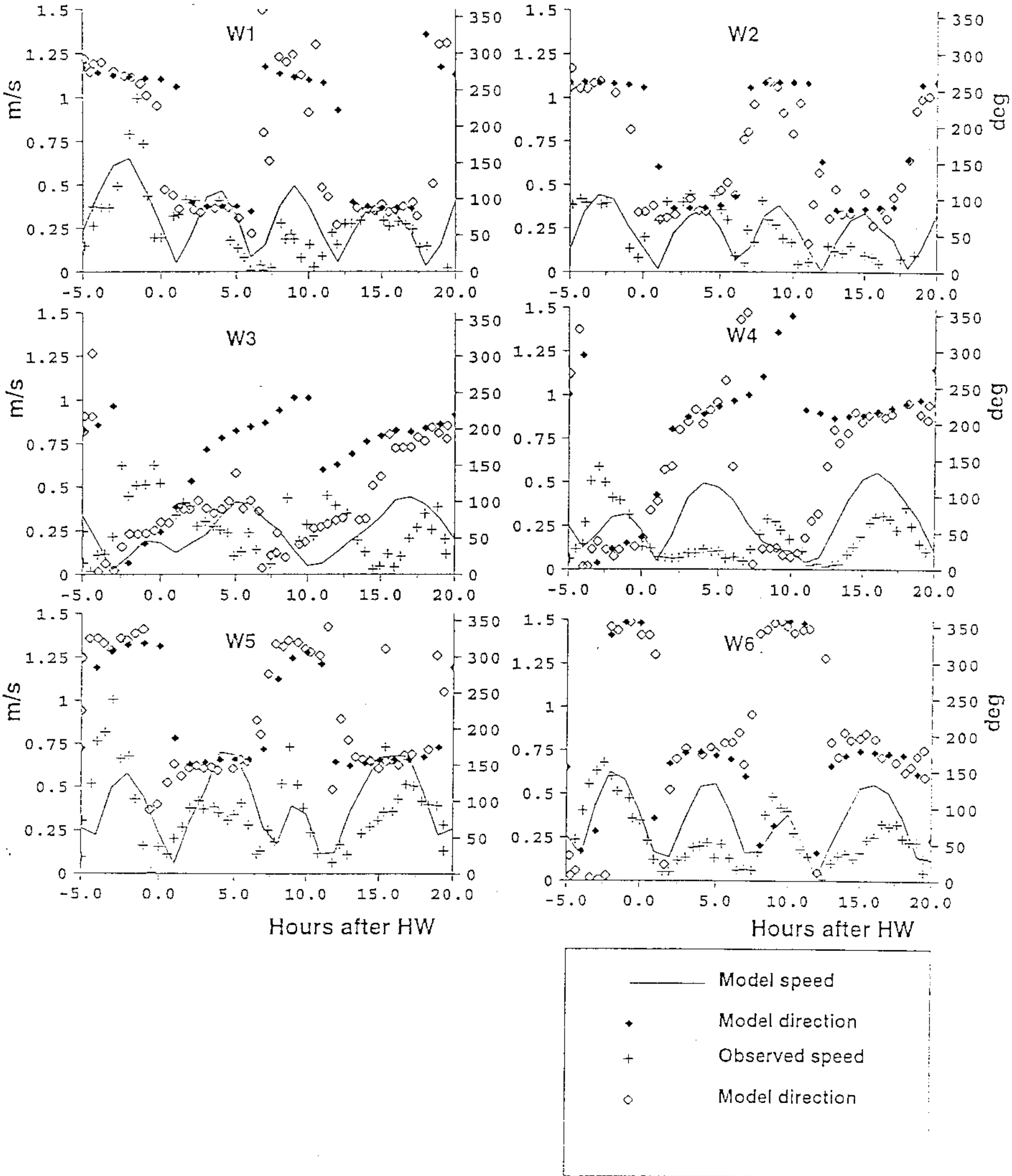



| TSUEN WAN BAY FURTHER RECLAMATION, AREA 35<br>WET SEASON NEAP TIDE COMPARISON | FIGURE 28 |
| --- | --- |



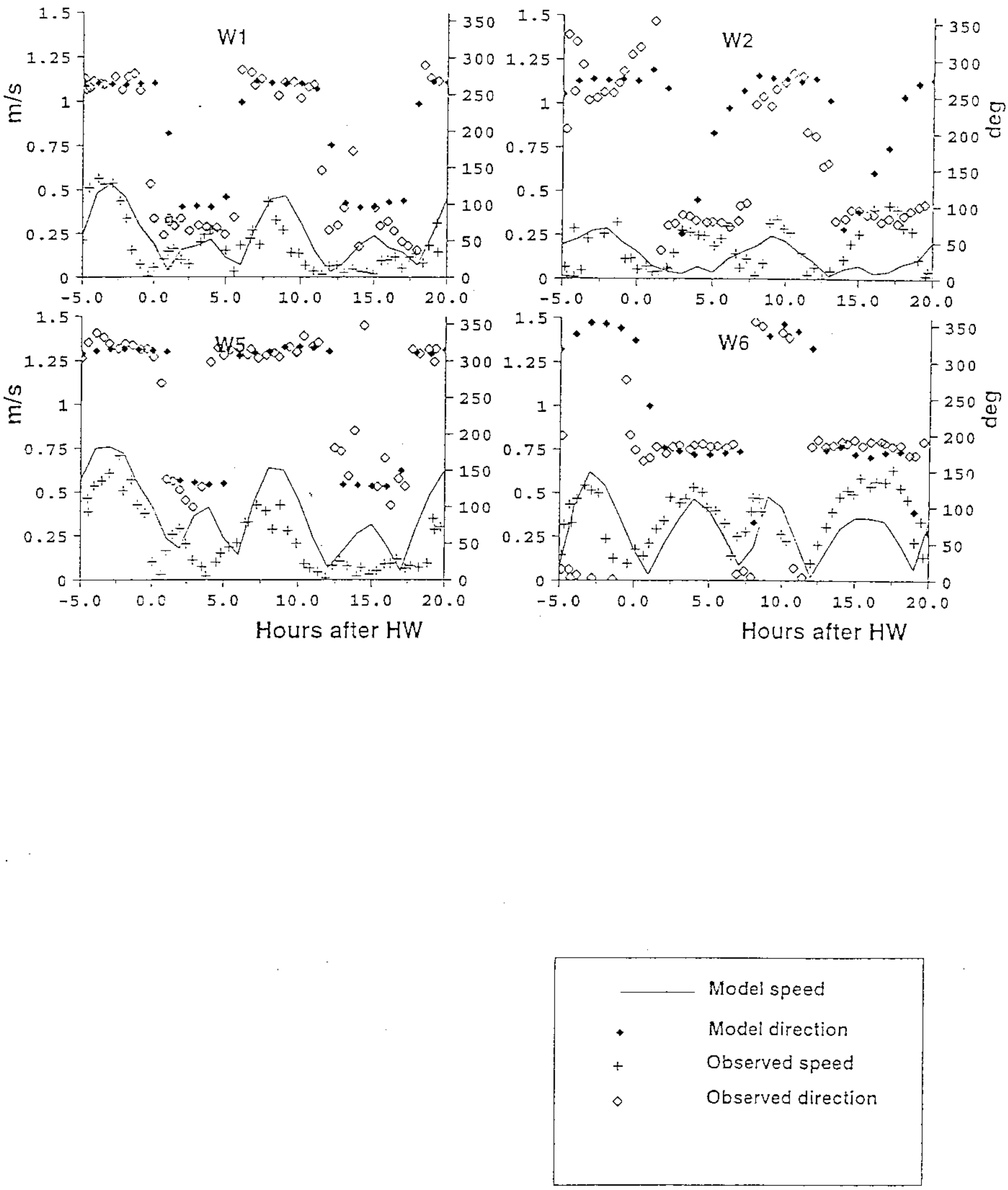

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
WET SEASON NEAP TIDE COMPARISON

FIGURE 29




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
W SITES, SURFACE CURRENT COMPARISON, WET SEASON
NEAP TIDE

FIGURE 30

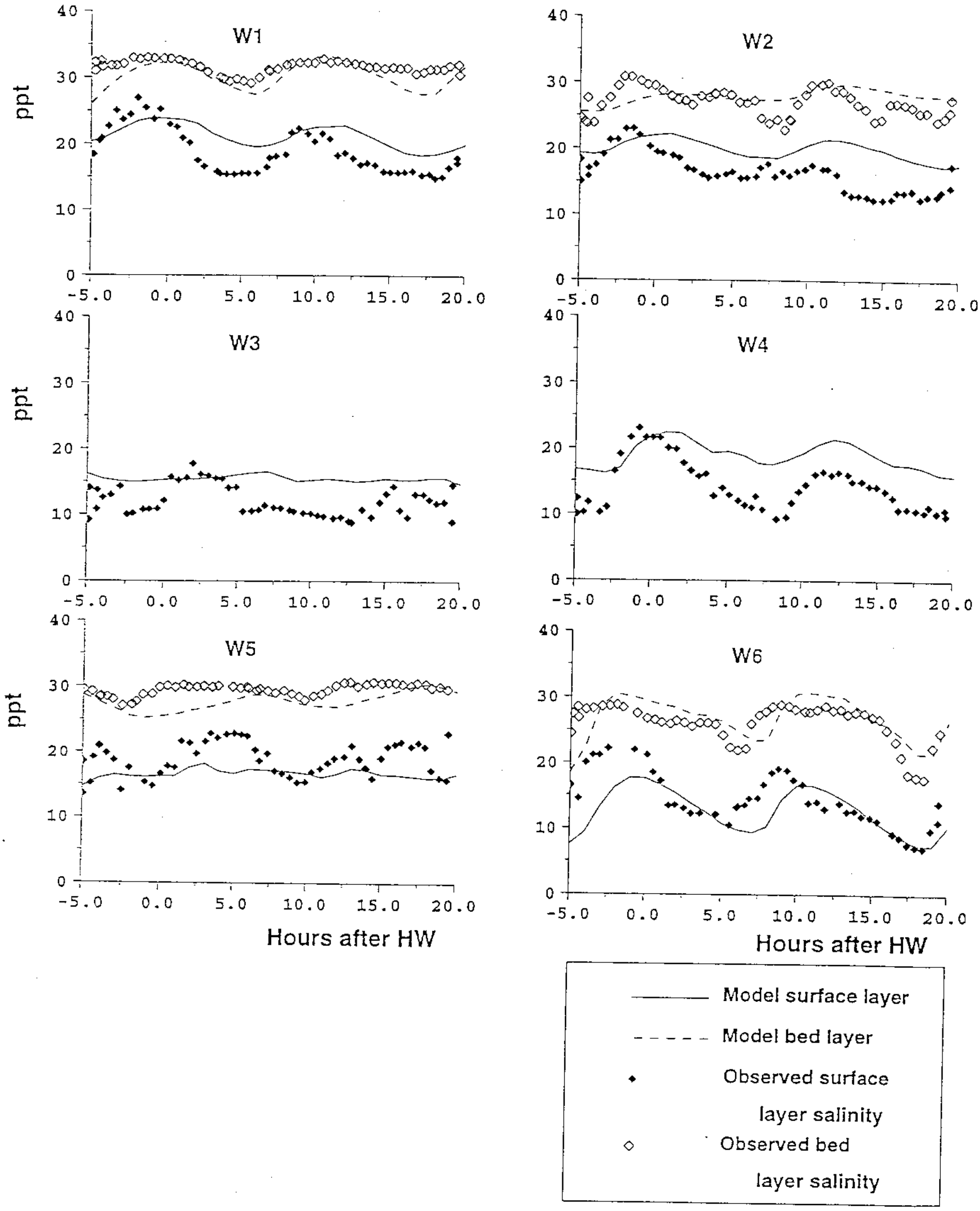



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

W SITES, BED CURRENT COMPARISON, WET SEASON

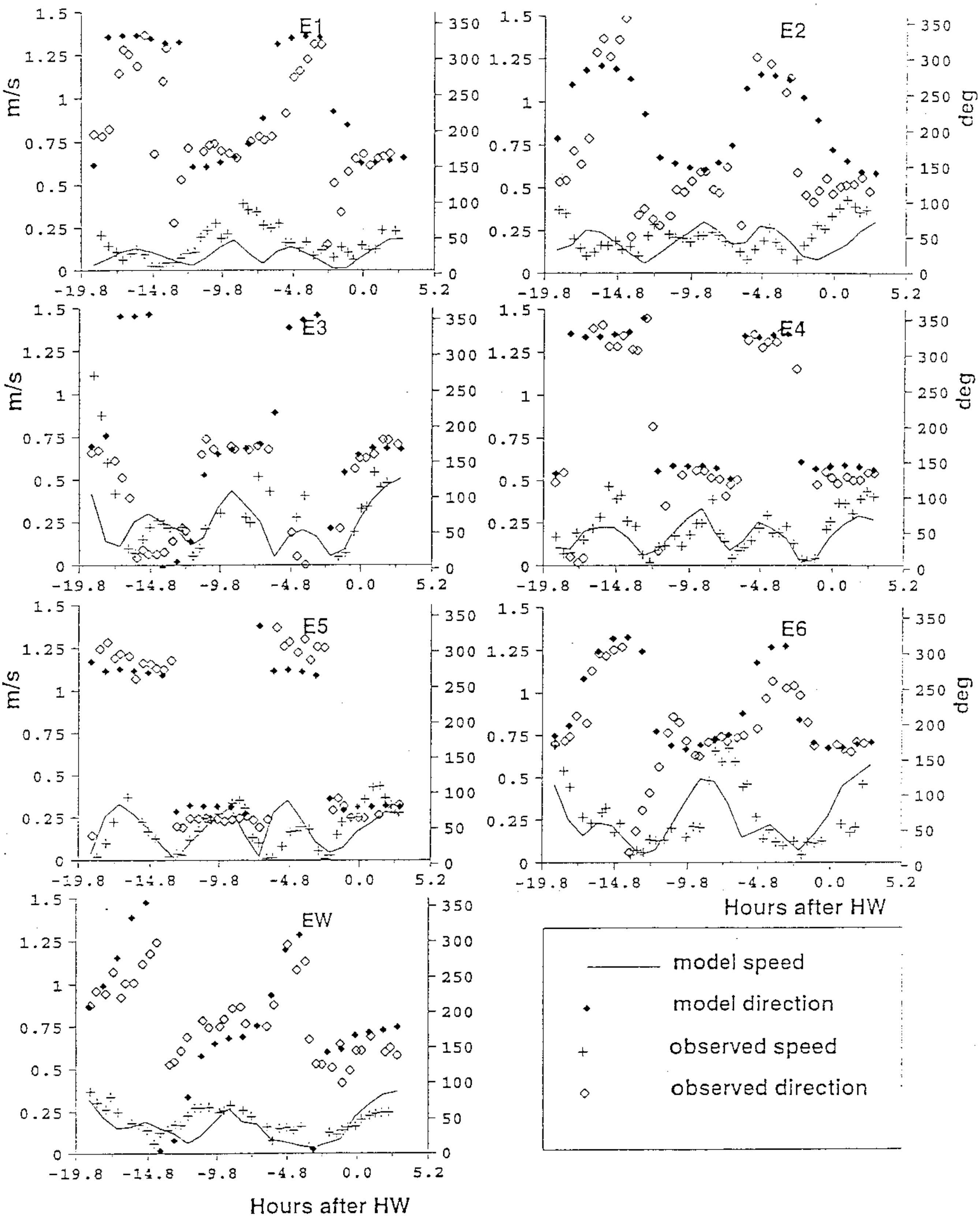
NEAP TIDE

FIGURE 31

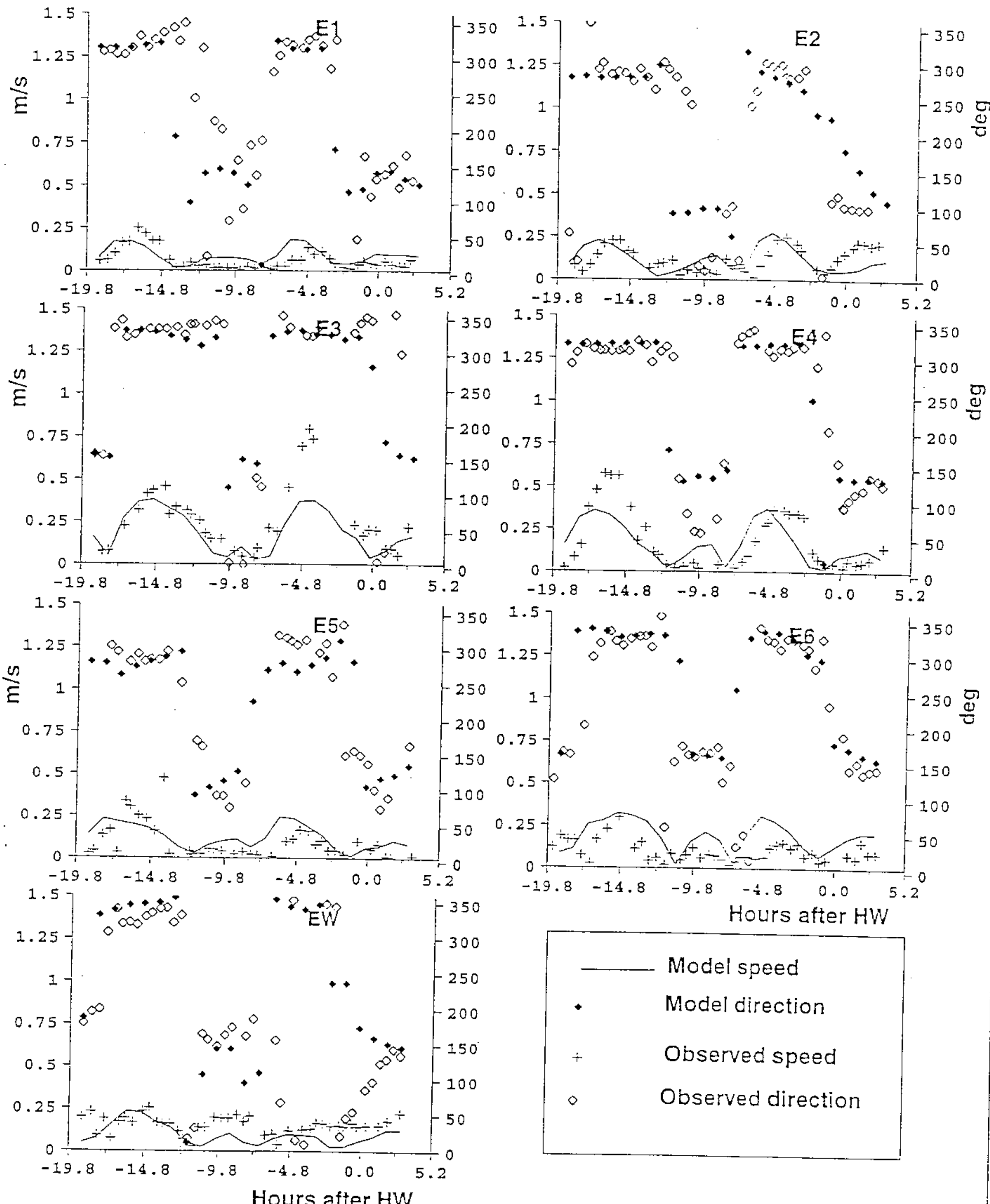



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
W SITES, SALINITY COMPARISON, WET SEASON
NEAP TIDE

FIGURE 32



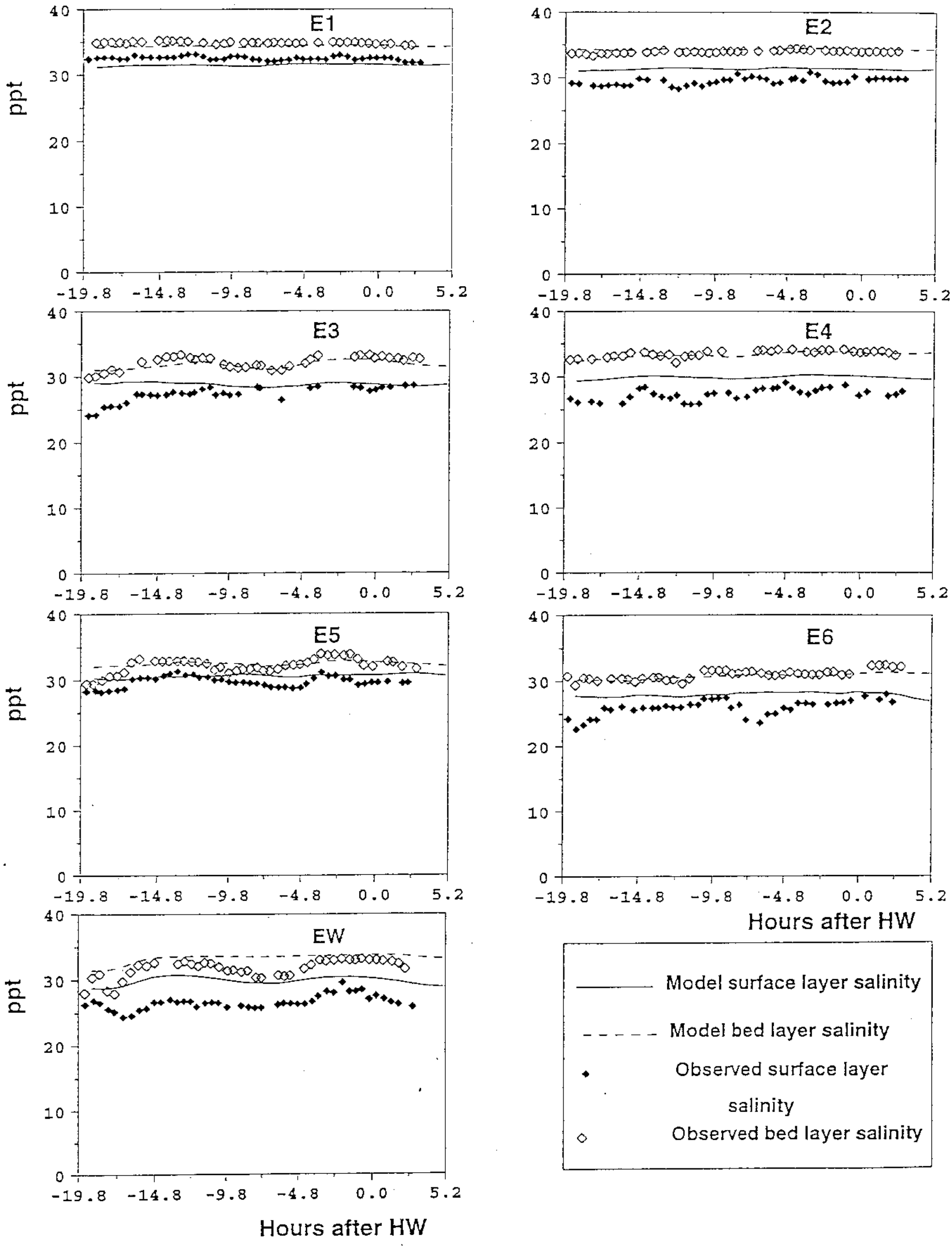

| TSUEN WAN BAY FURTHER RECLAMATION, AREA 35<br>E SITES, SURFACE CURRENT COMPARISON, WET SEASON<br>NEAP TIDE | FIGURE 33 |
|---|---|



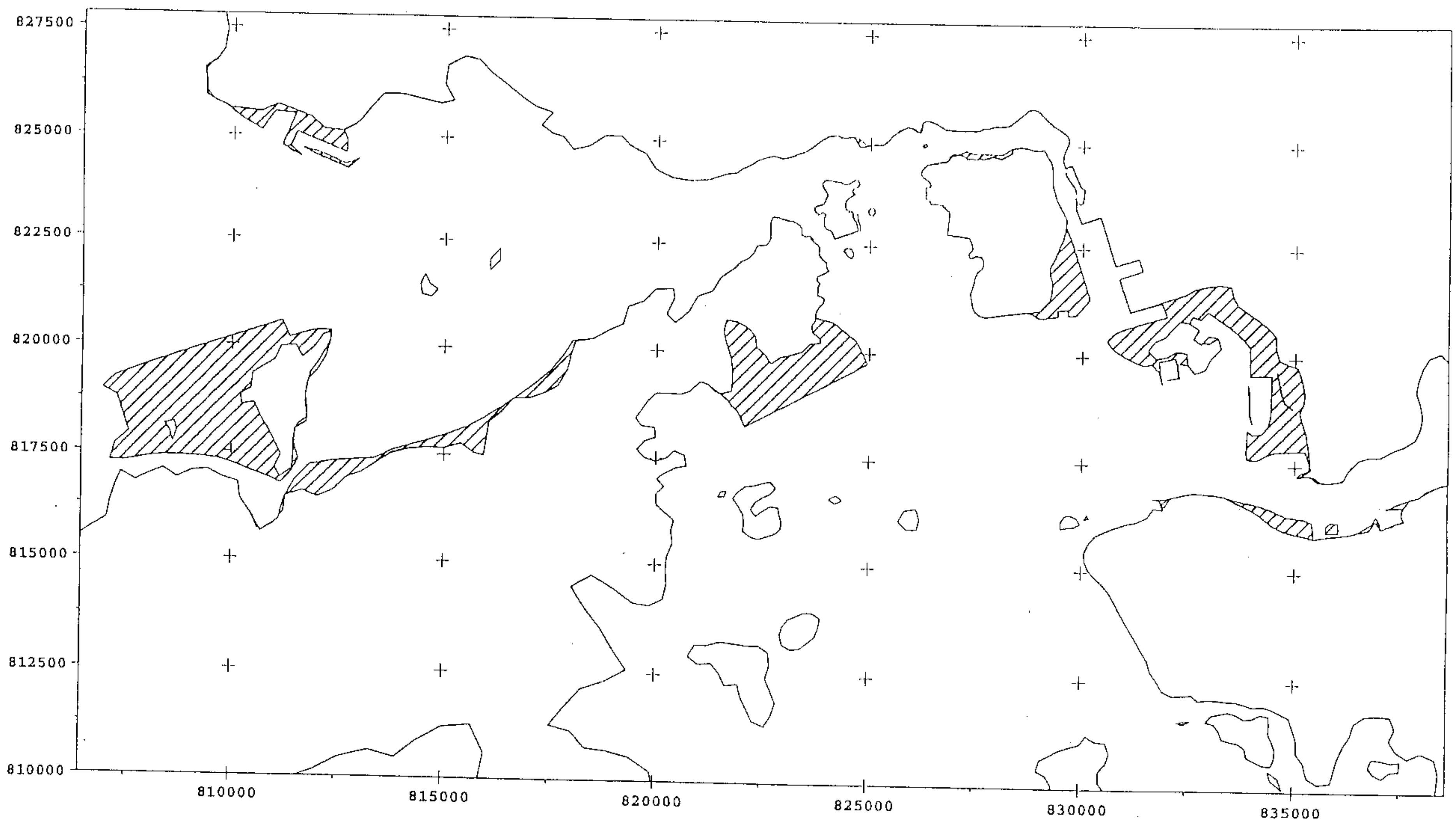

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

E SITES, BED CURRENT COMPARISON, WET SEASON NEAP TIDE

FIGURE 34

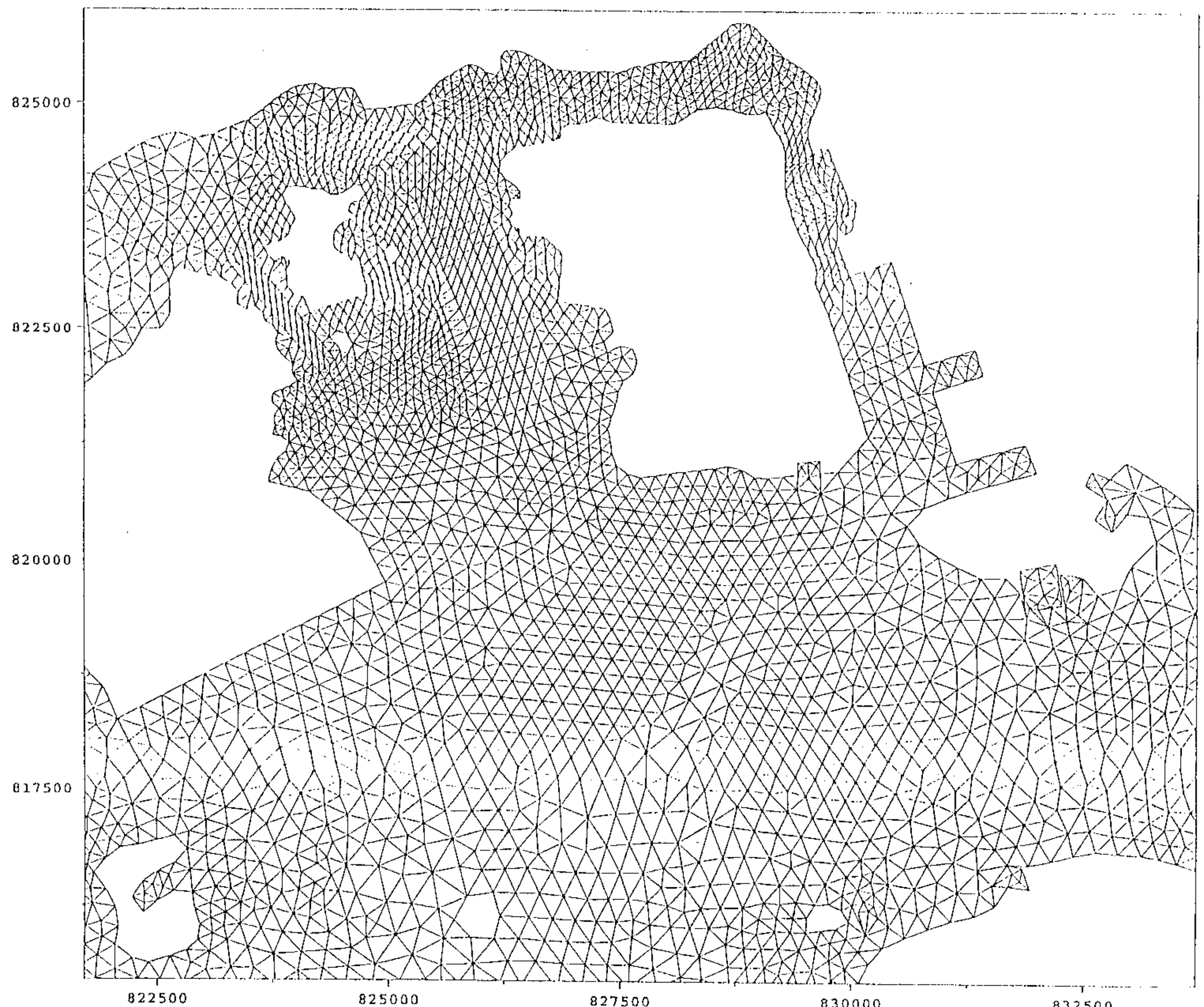



| TSUEN WAN BAY FURTHER RECLAMATION, AREA 35<br>E SITES, SALINITY COMPARISON, WET SEASON<br>NEAP TIDE | FIGURE 35 |
|---|---|



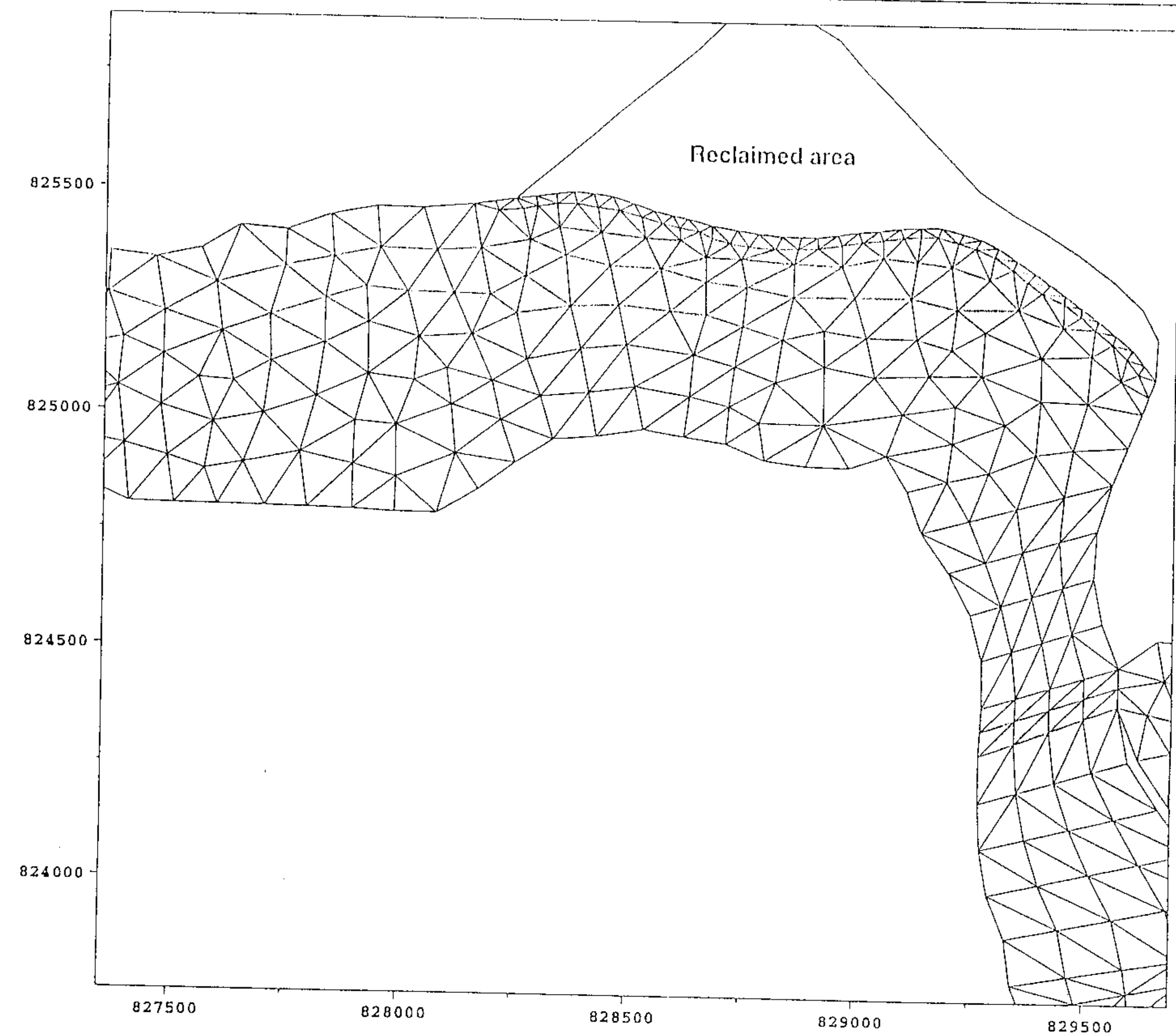

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
CHANGES TO MODEL COASTLINE, 1990-2004

FIGURE 36



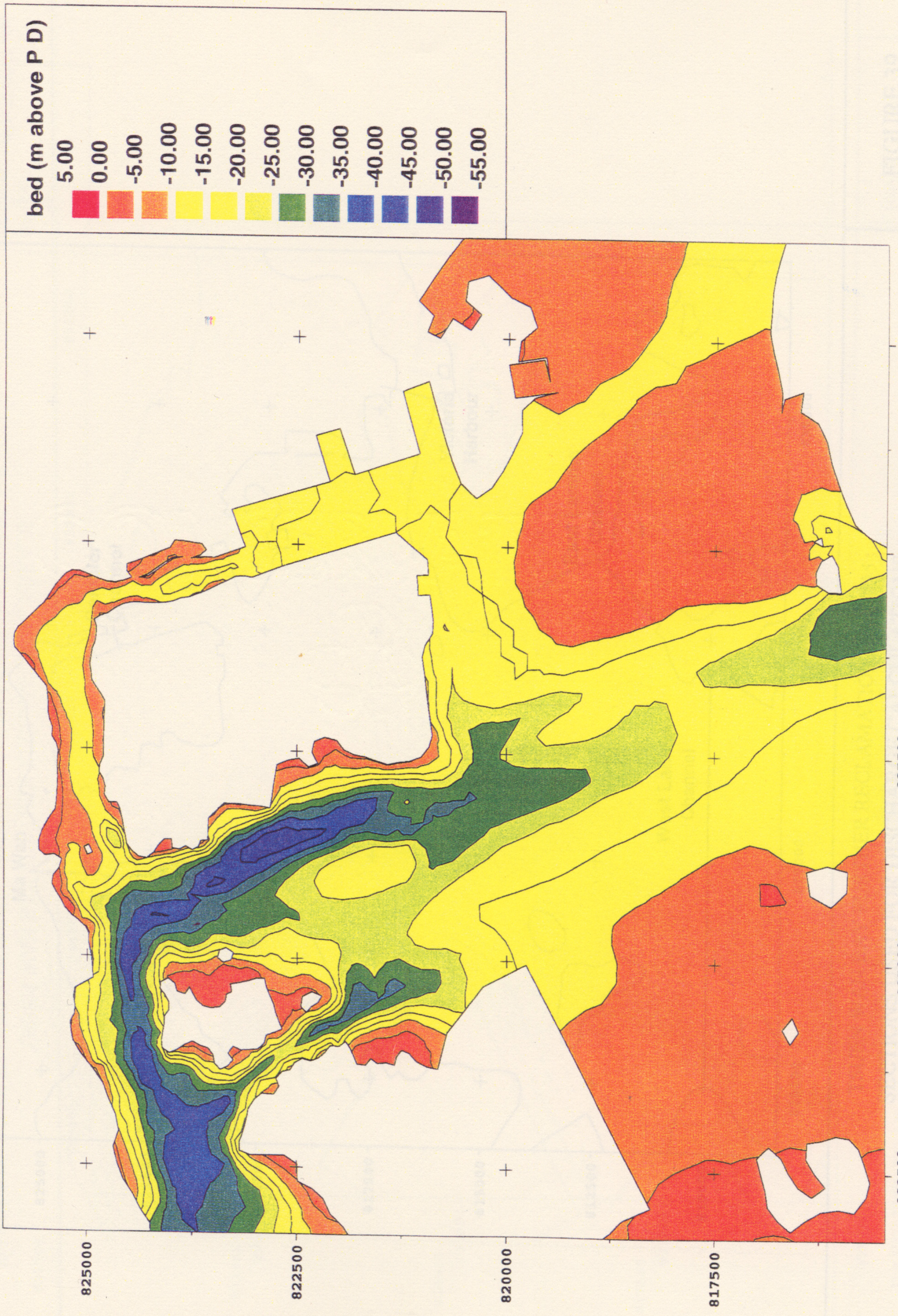

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
TELEMAC 3D 2004 BASELINE MODEL MESH

FIGURE 37a



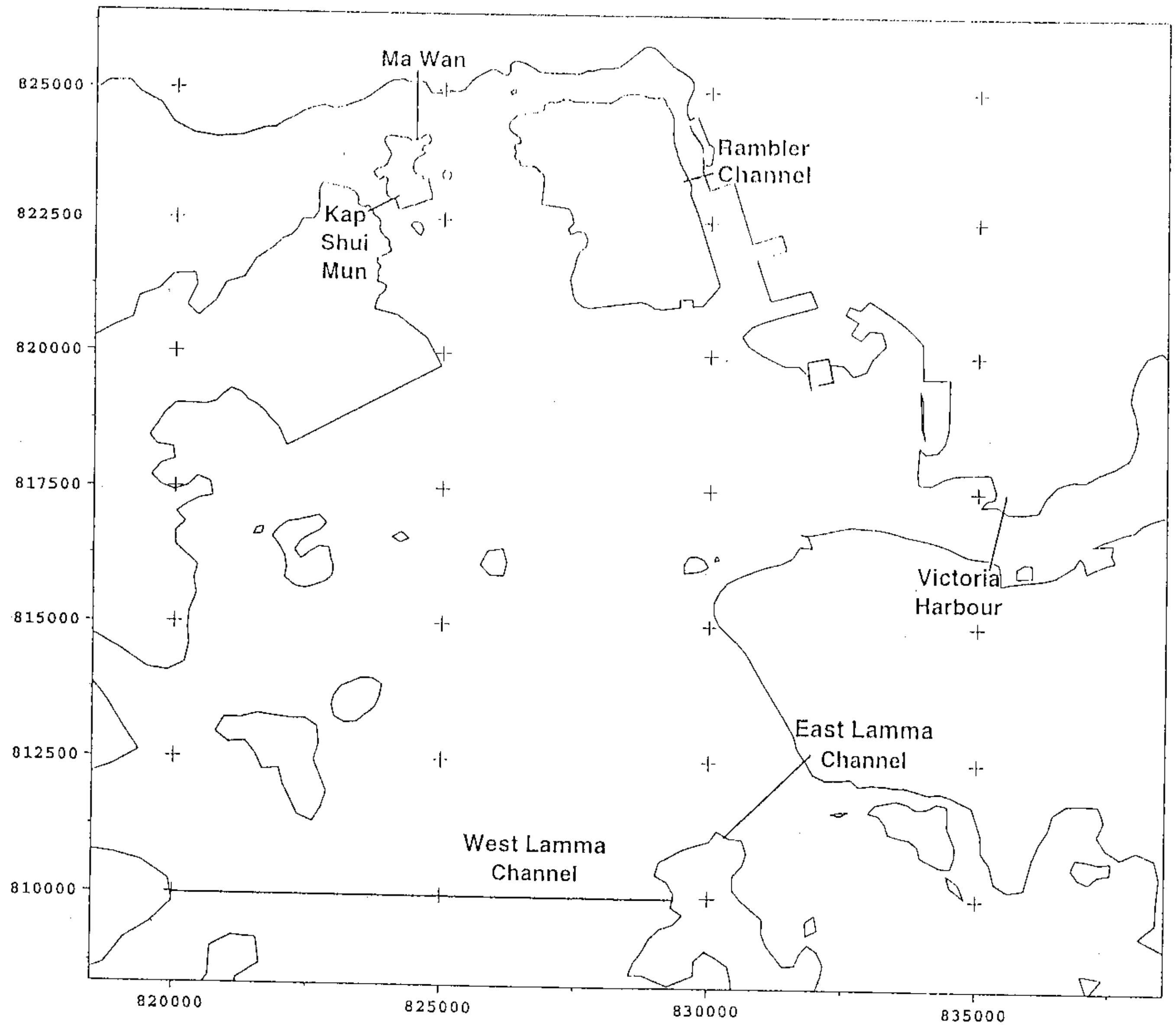

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
TELEMAC 3D COMPLETED RECLAMATION MODEL MESH

FIGURE 37b



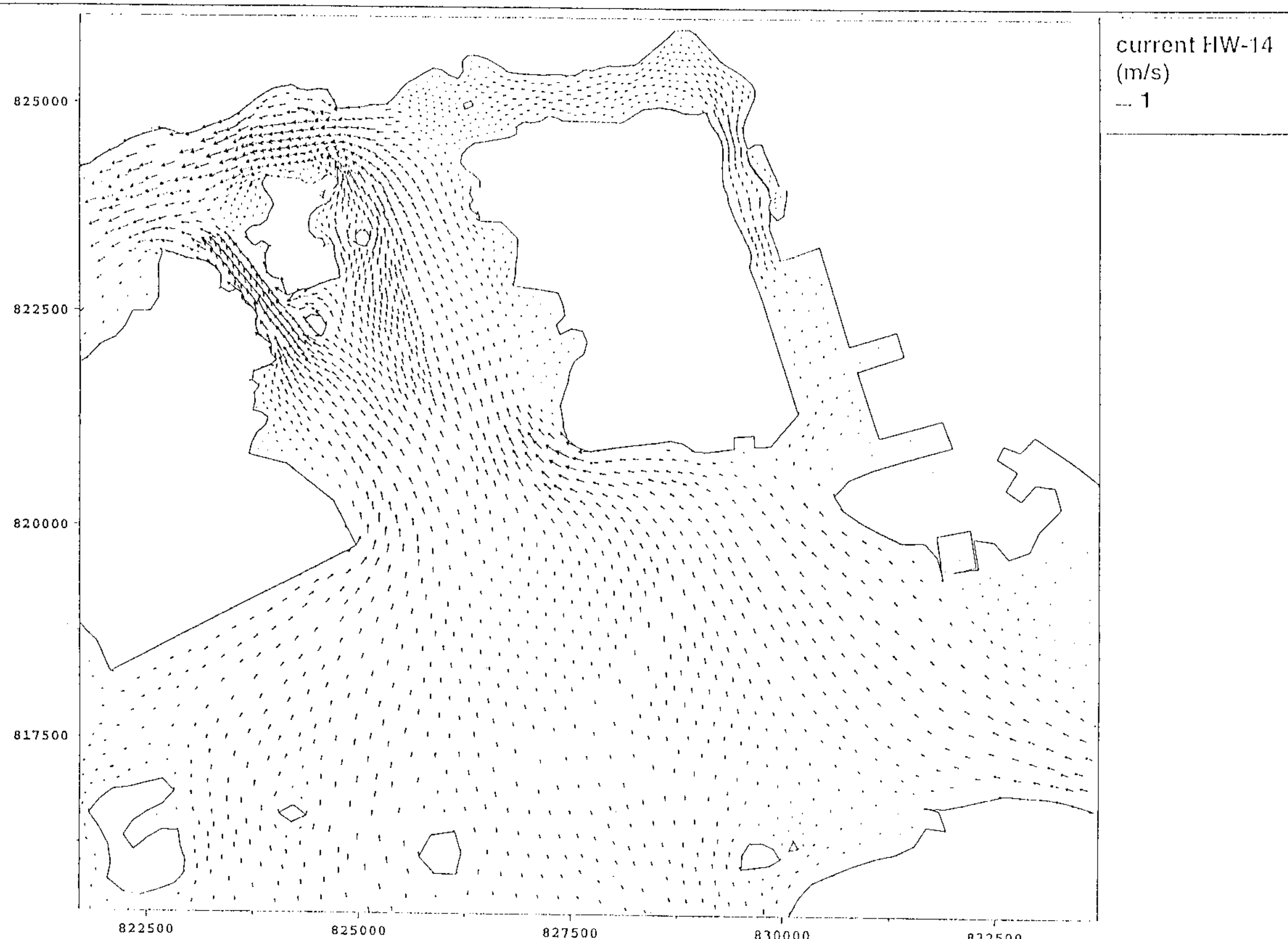

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
TELEMAC 3D 2004 BASELINE MODEL BATHYMETRY

FIGURE 38



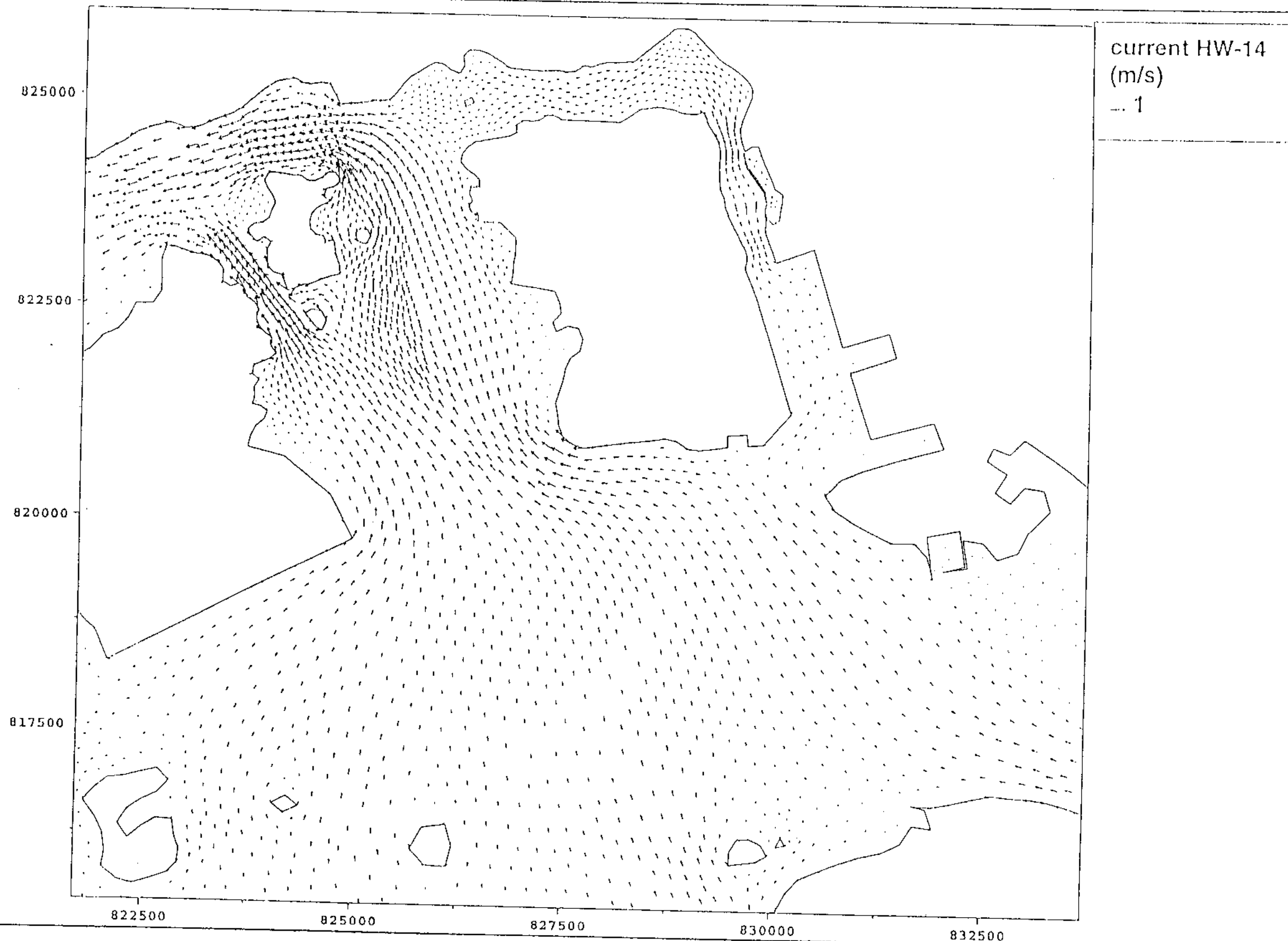

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
SECTIONS USED FOR DISCHARGE CALCULATIONS

FIGURE 39




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK FLOOD VECTORS, DRY SEASON SPRING TIDE, SURFACE (LARGE VIEW)

FIGURE 40

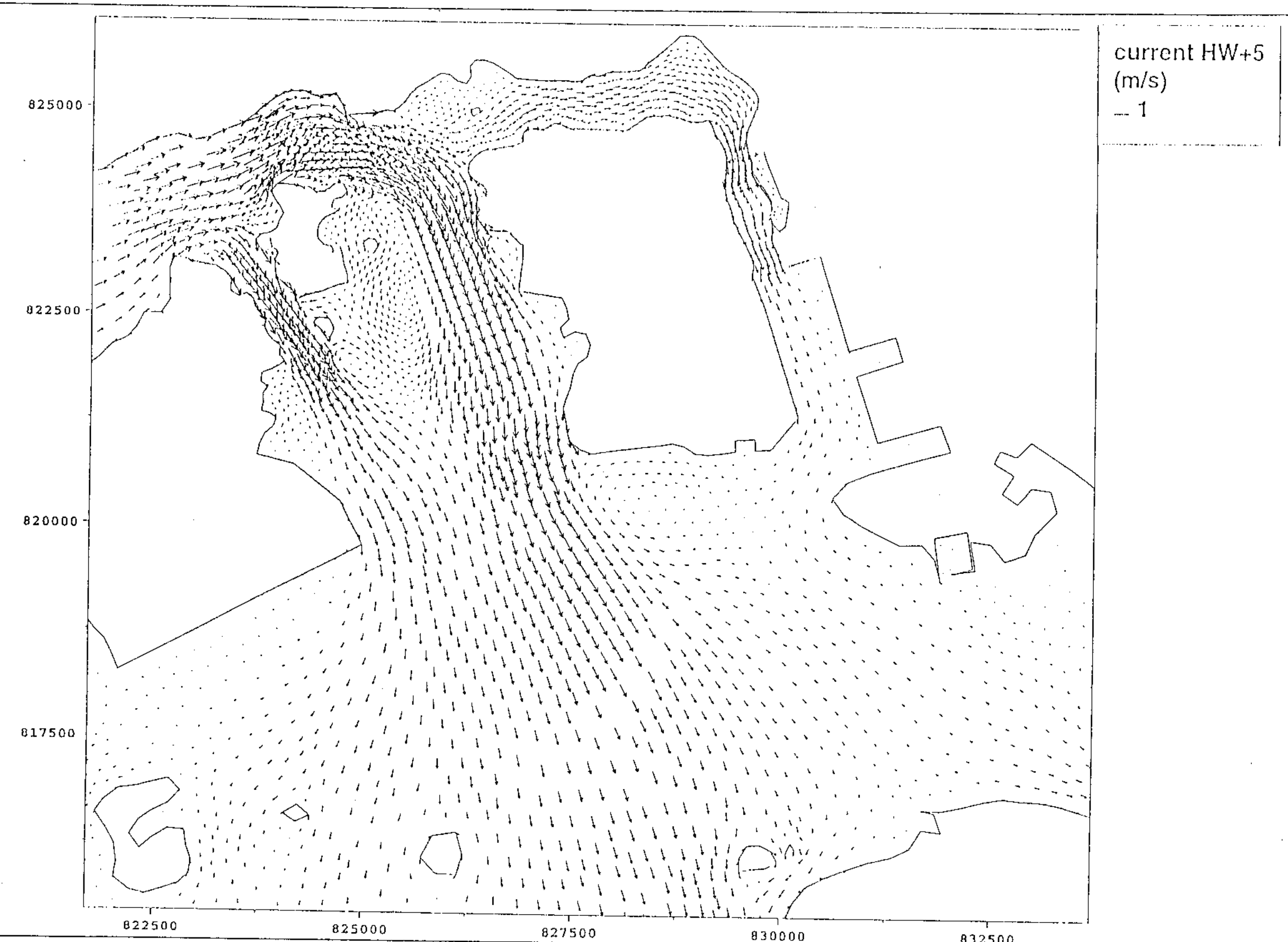



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK FLOOD VECTORS, DRY SEASON SPRING TIDE, MID-DEPTH (LARGE VIEW)

FIGURE 41

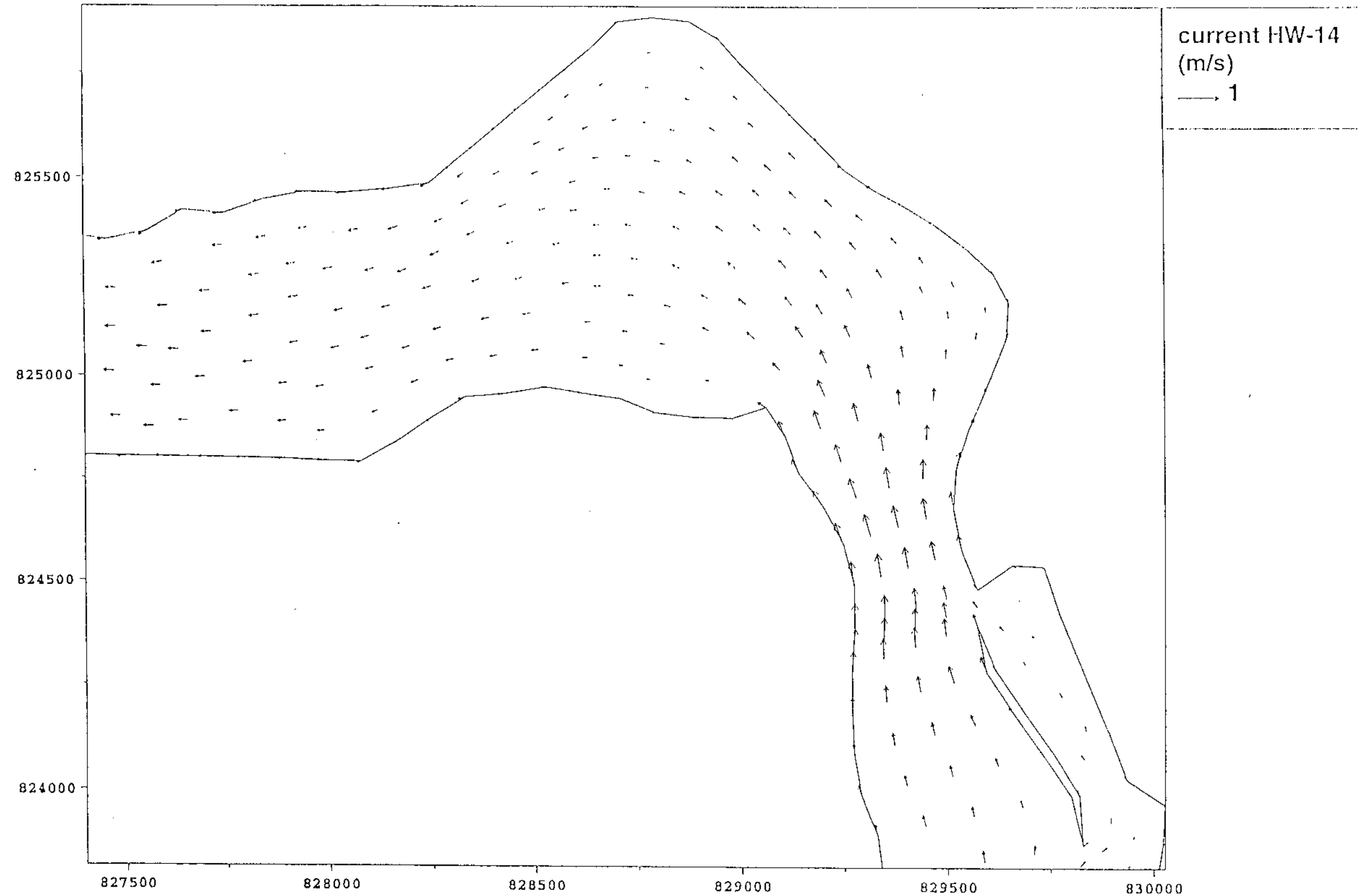

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK EBB VECTORS, DRY SEASON SPRING TIDE, SURFACE (LARGE VIEW)

FIGURE 42



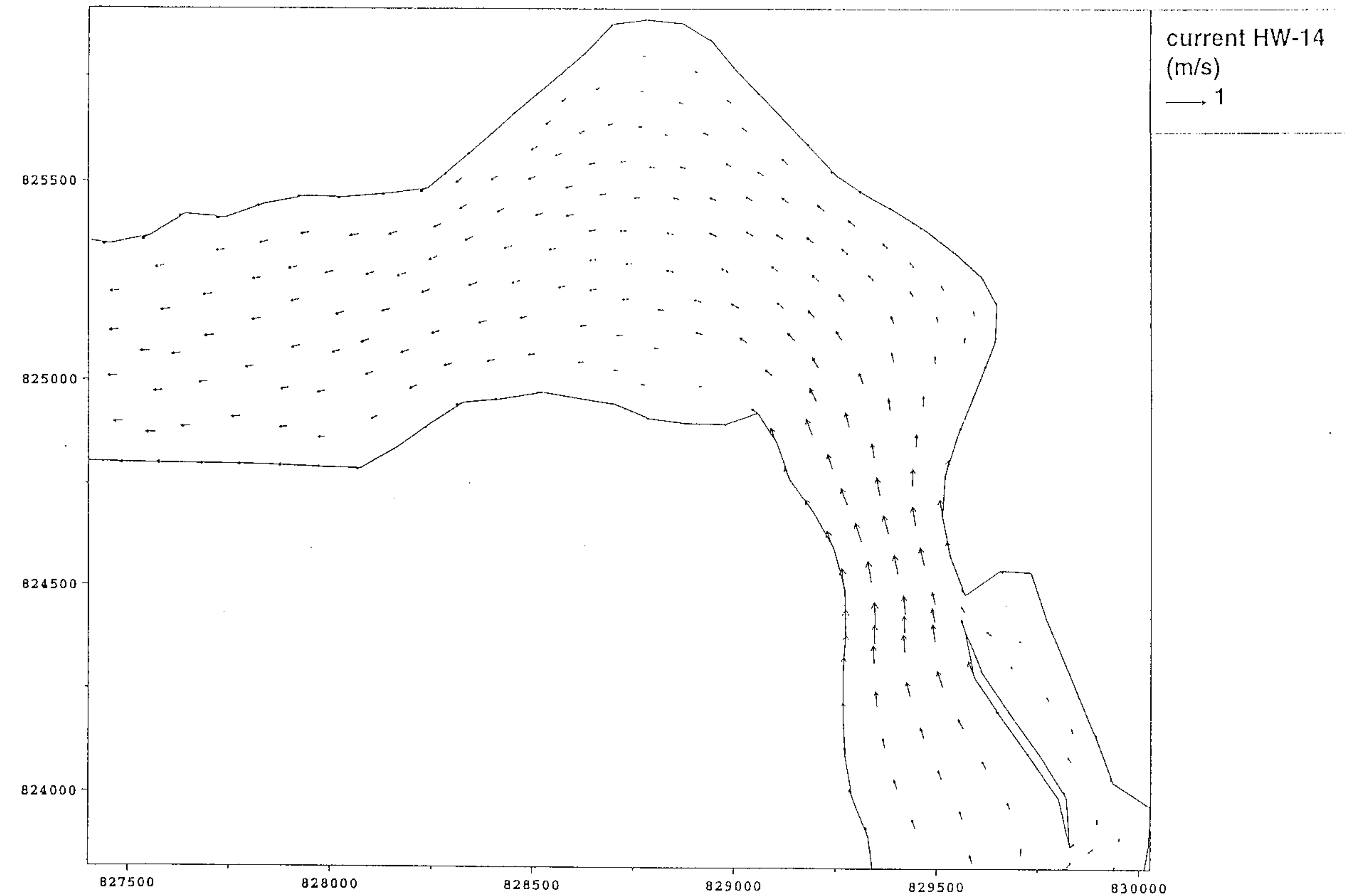

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK EBB VECTORS, DRY SEASON SPRING TIDE, MID-DEPTH (LARGE VIEW)

FIGURE 43



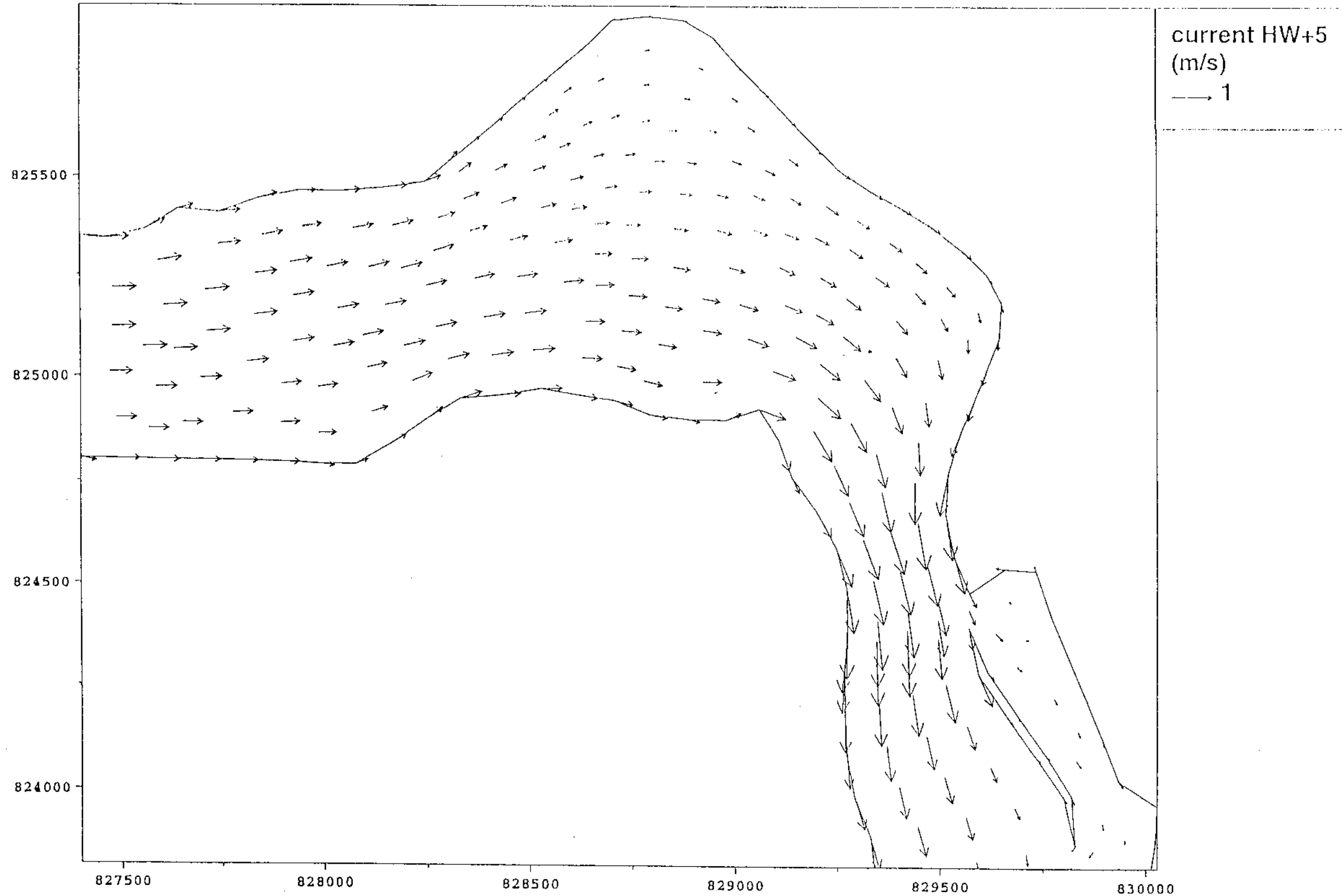

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK FLOOD VECTORS, DRY SEASON SPRING TIDE, SURFACE (TSUEN WAN BAY)

FIGURE 44




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK FLOOD VECTORS, DRY SEASON SPRING TIDE, MID-DEPTH (TSUEN WAN BAY)

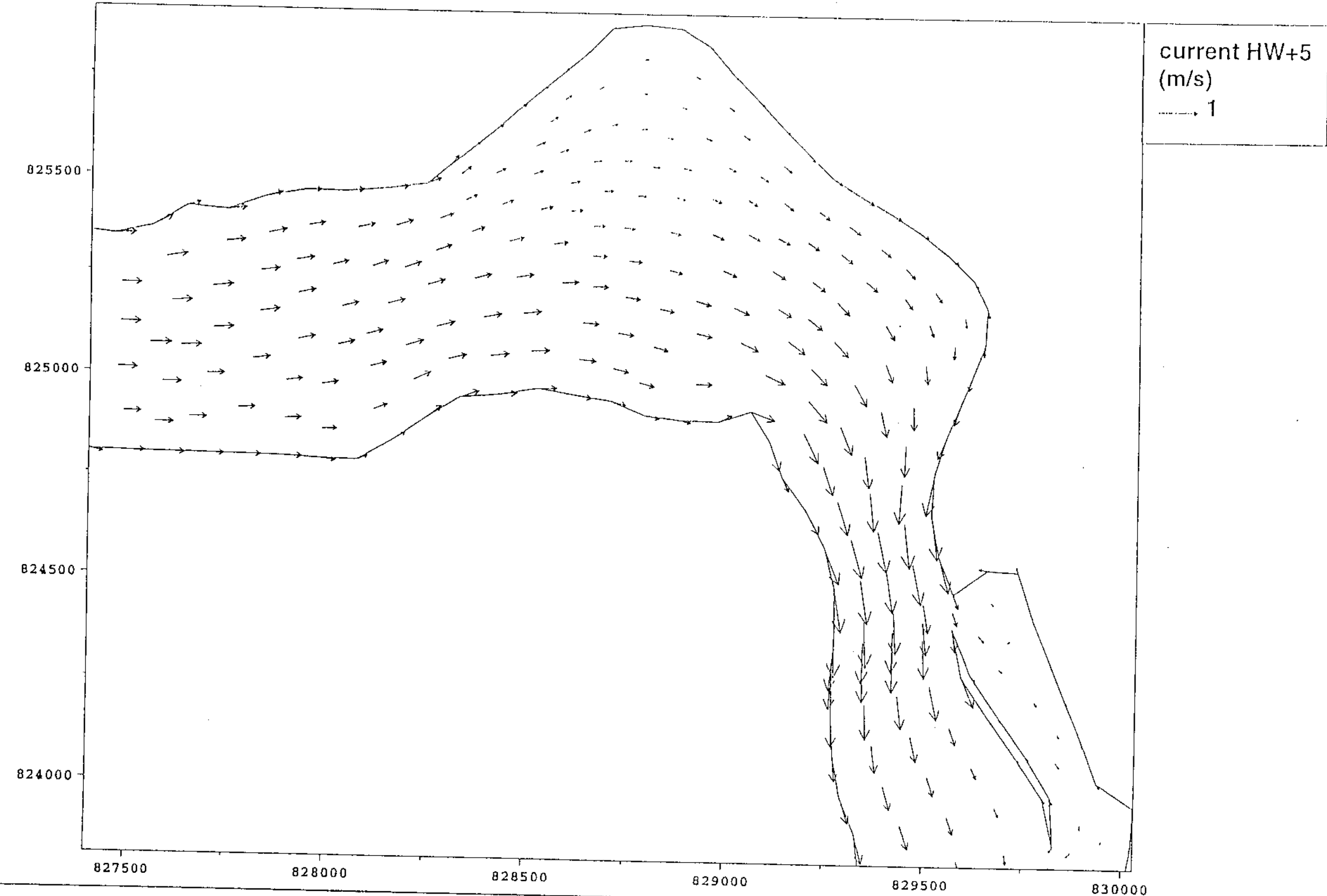
FIGURE 45




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

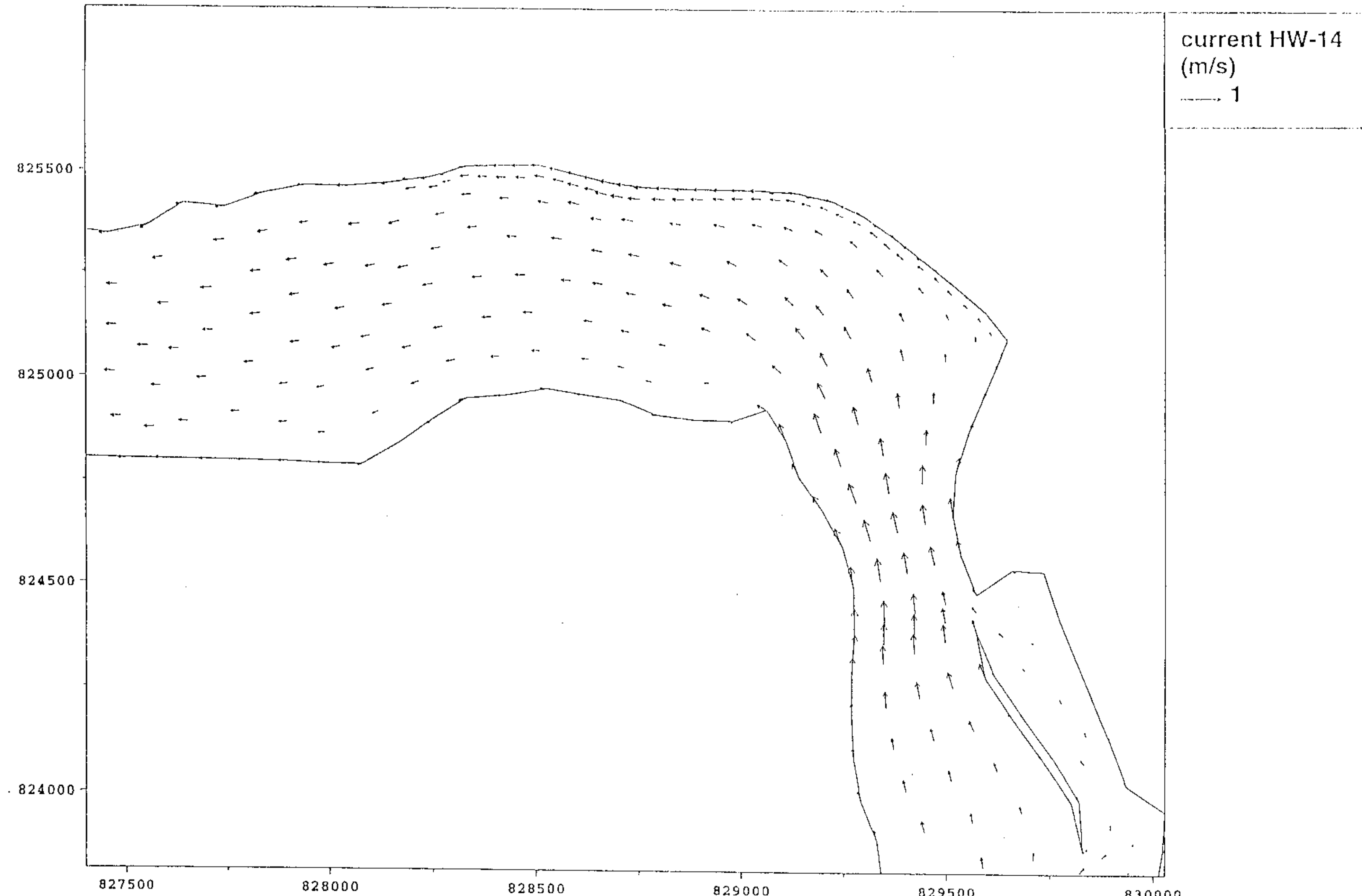
BASELINE, PEAK EBB VECTORS, DRY SEASON SPRING TIDE, SURFACE (TSUEN WAN BAY)

FIGURE 46



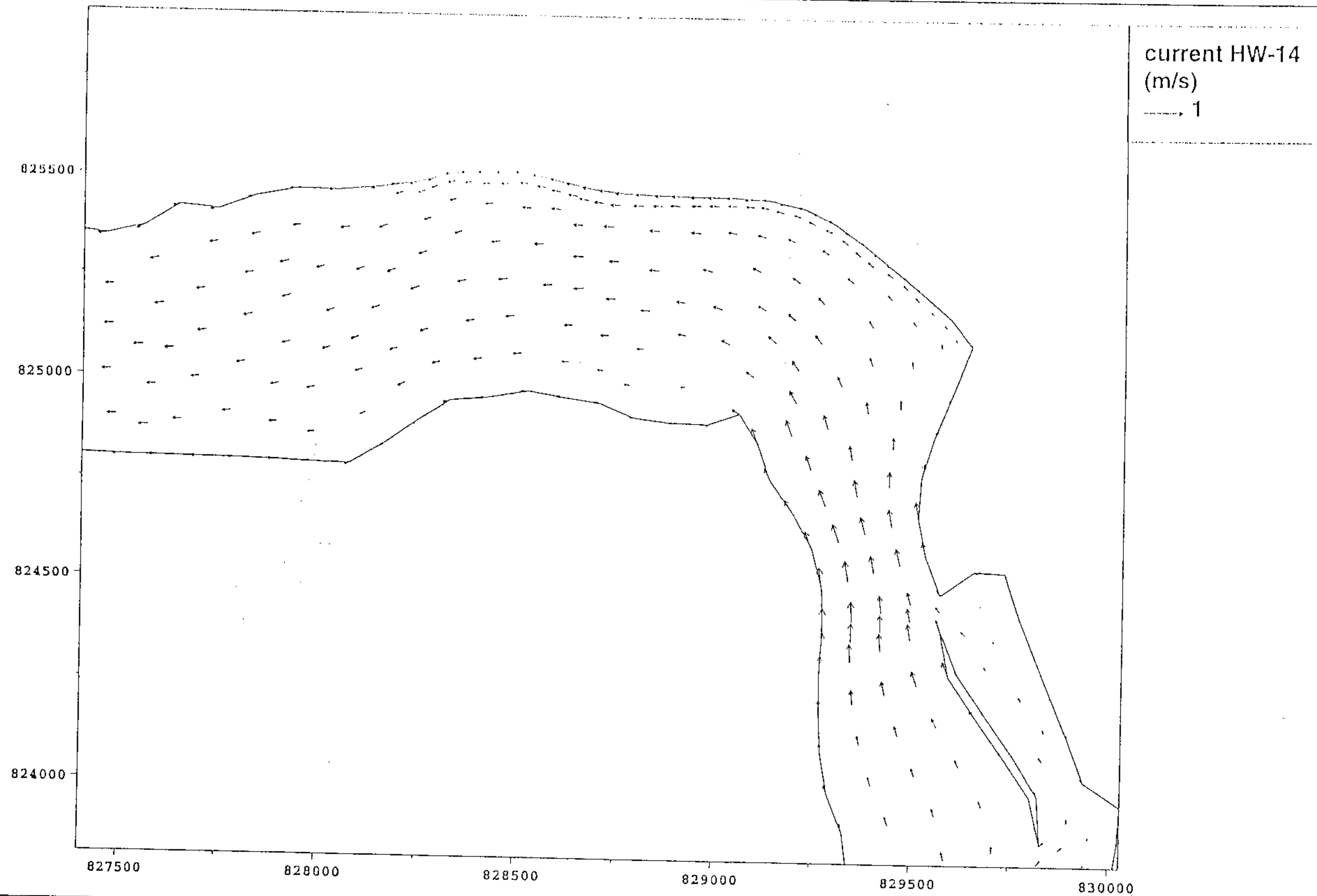

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK EBB VECTORS, DRY SEASON SPRING TIDE, MID-DEPTH (TSUEN WAN BAY)

FIGURE 47



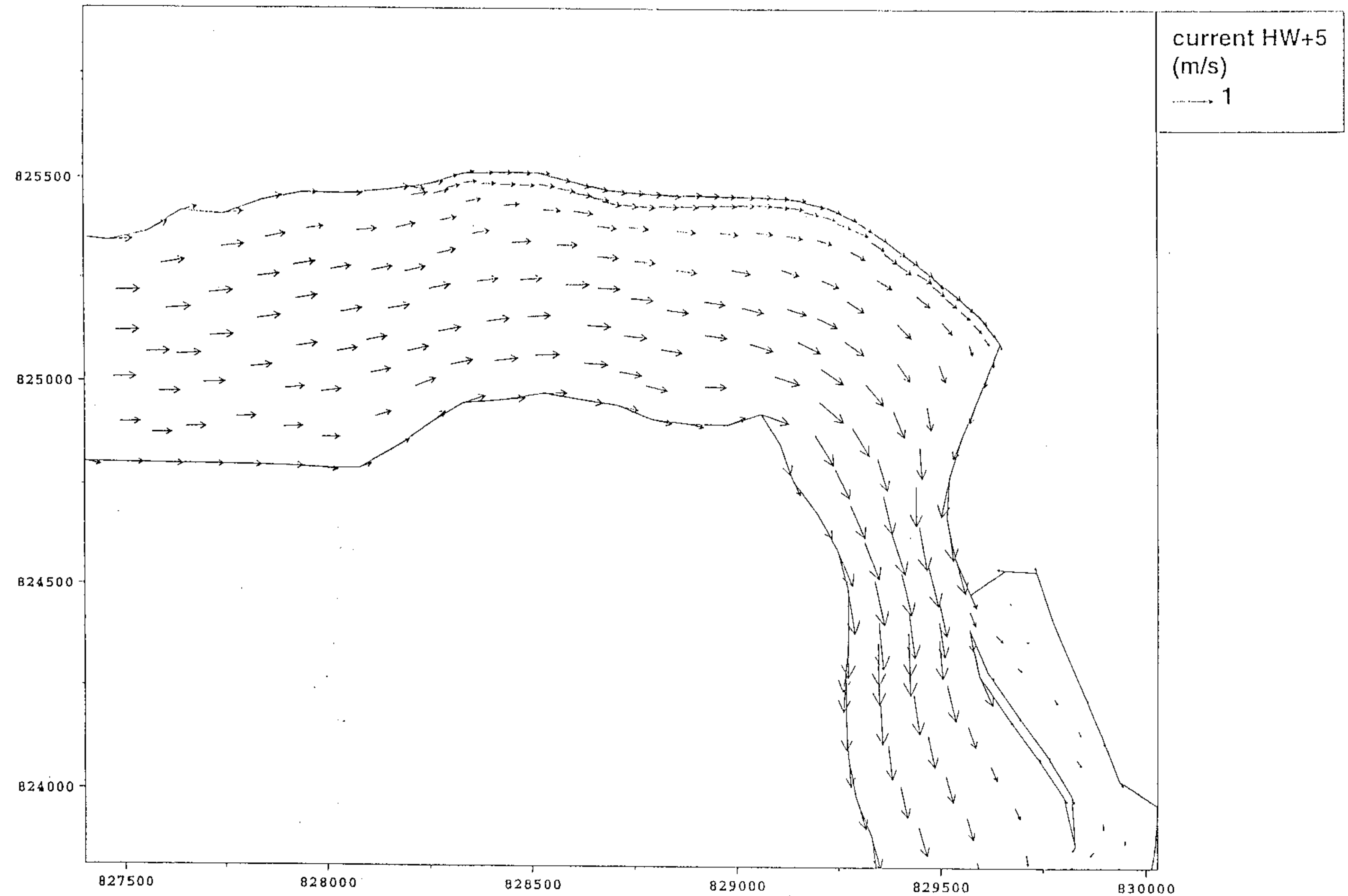

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
COMPLETED, PEAK FLOOD VECTORS, DRY SEASON SPRING TIDE, SURFACE (TSUEN WAN BAY)

FIGURE 48



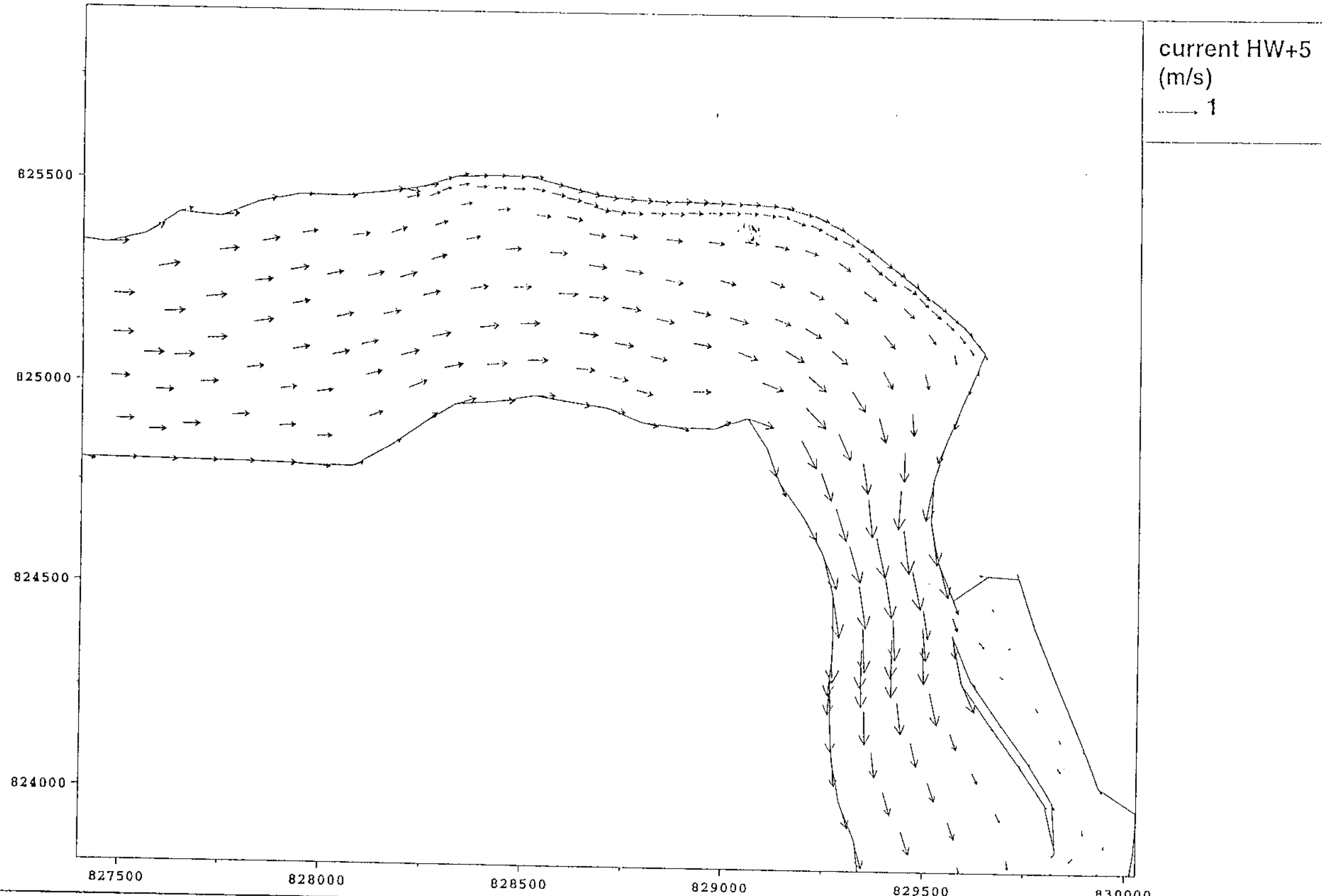

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
COMPLETED, PEAK FLOOD VECTORS, DRY SEASON SPRING TIDE, MID-DEPTH (TSUEN WAN BAY)

FIGURE 49



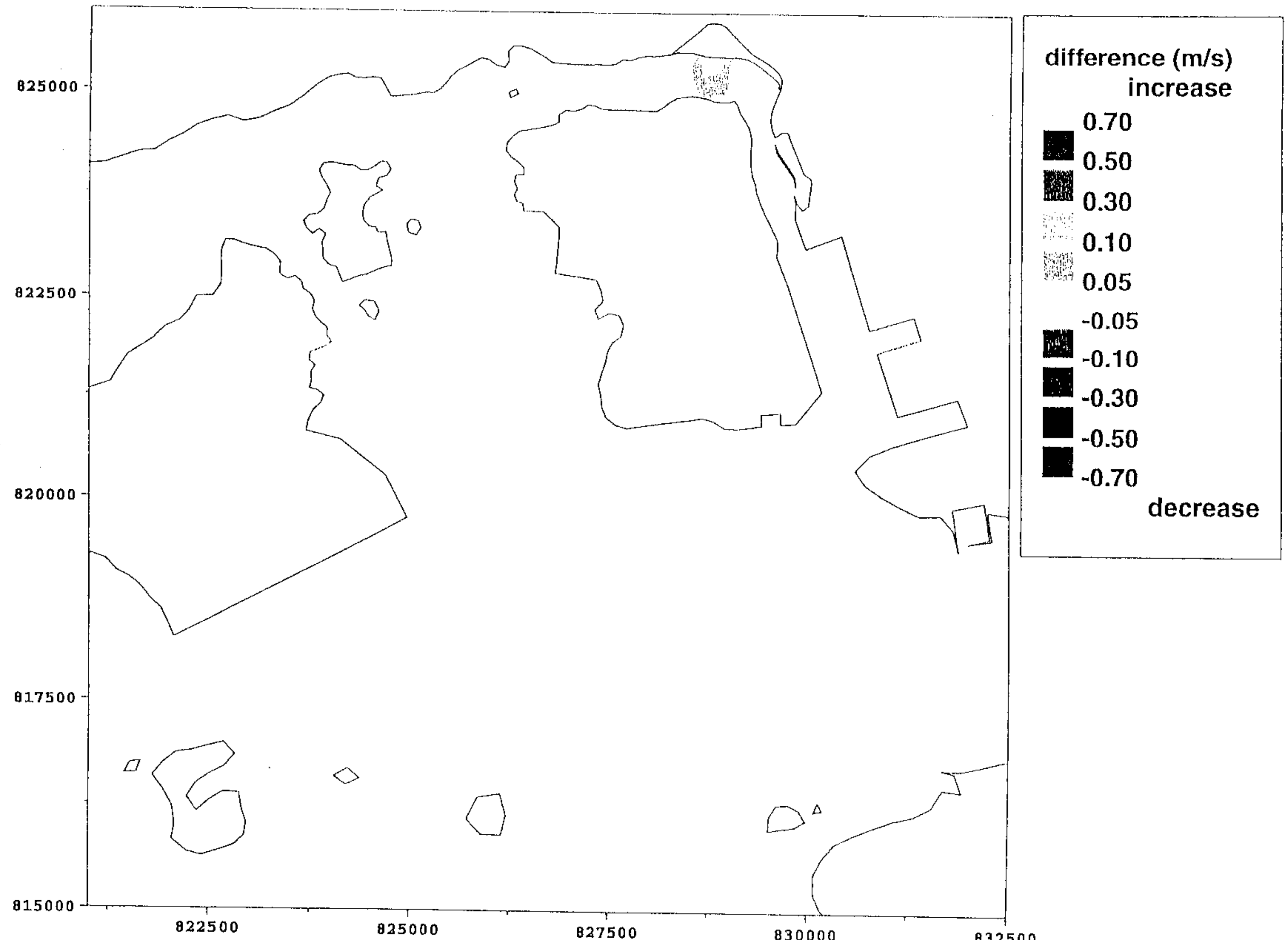

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
COMPLETED, PEAK EBB VECTORS, DRY SEASON SPRING TIDE, SURFACE (TSUEN WAN BAY)

FIGURE 50



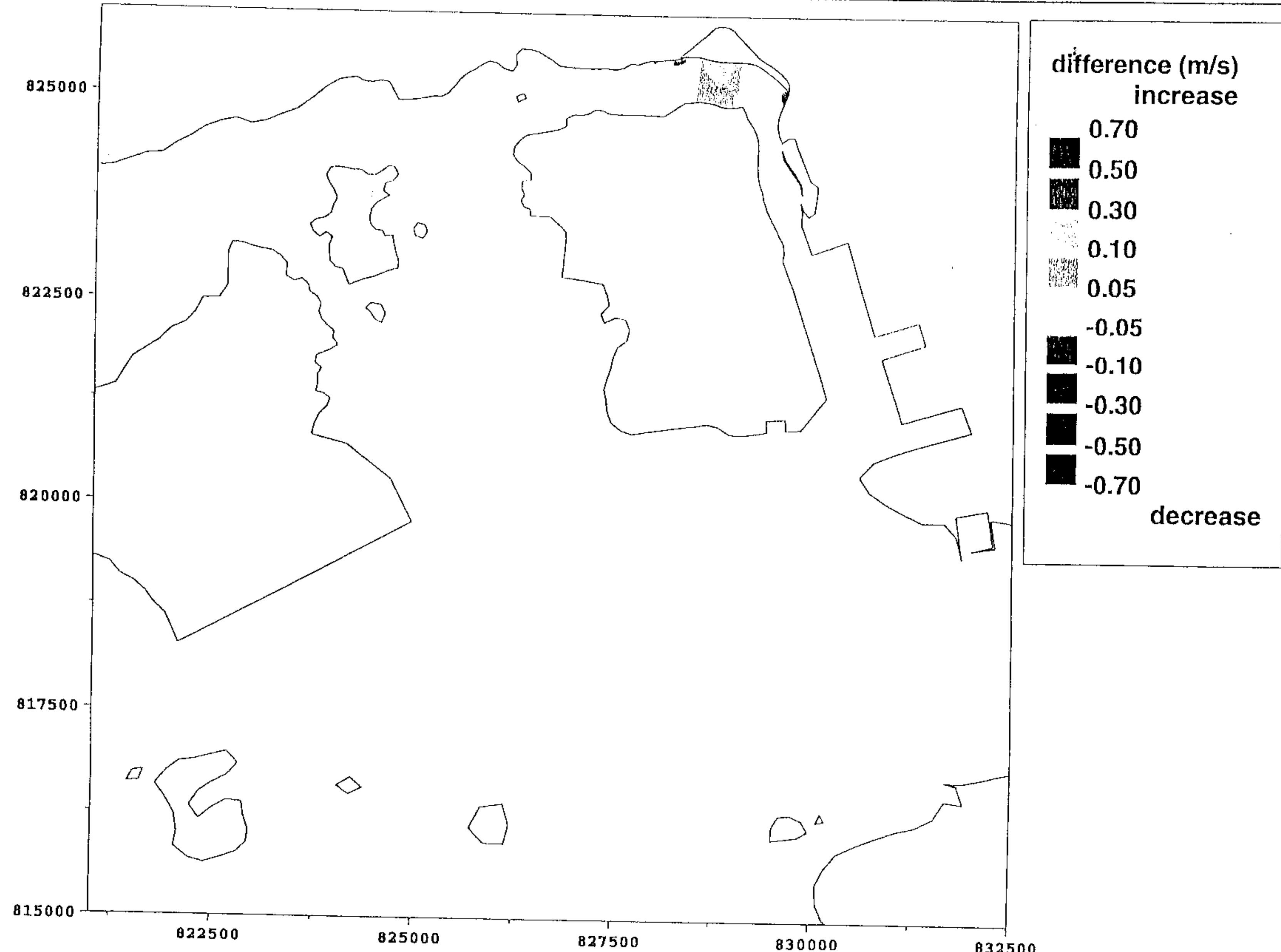

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
COMPLETED, PEAK EBB VECTORS, DRY SEASON SPRING TIDE, MID-DEPTH (TSUEN WAN BAY)

FIGURE 51



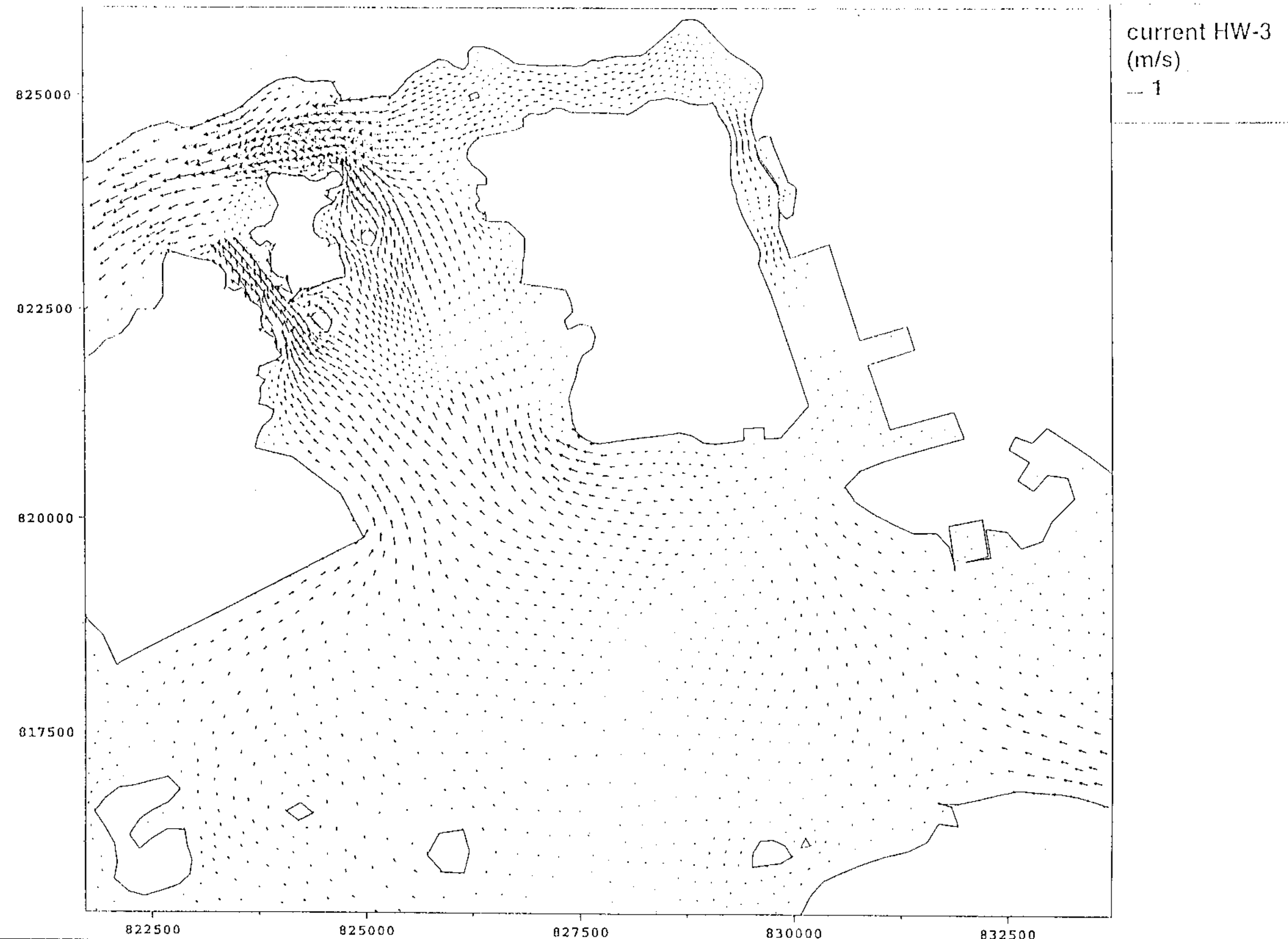

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
DIFFERENCE IN DEPTH-MEAN CURRENT SPEED, PEAK FLOOD, DRY SEASON SPRING TIDE

FIGURE 52



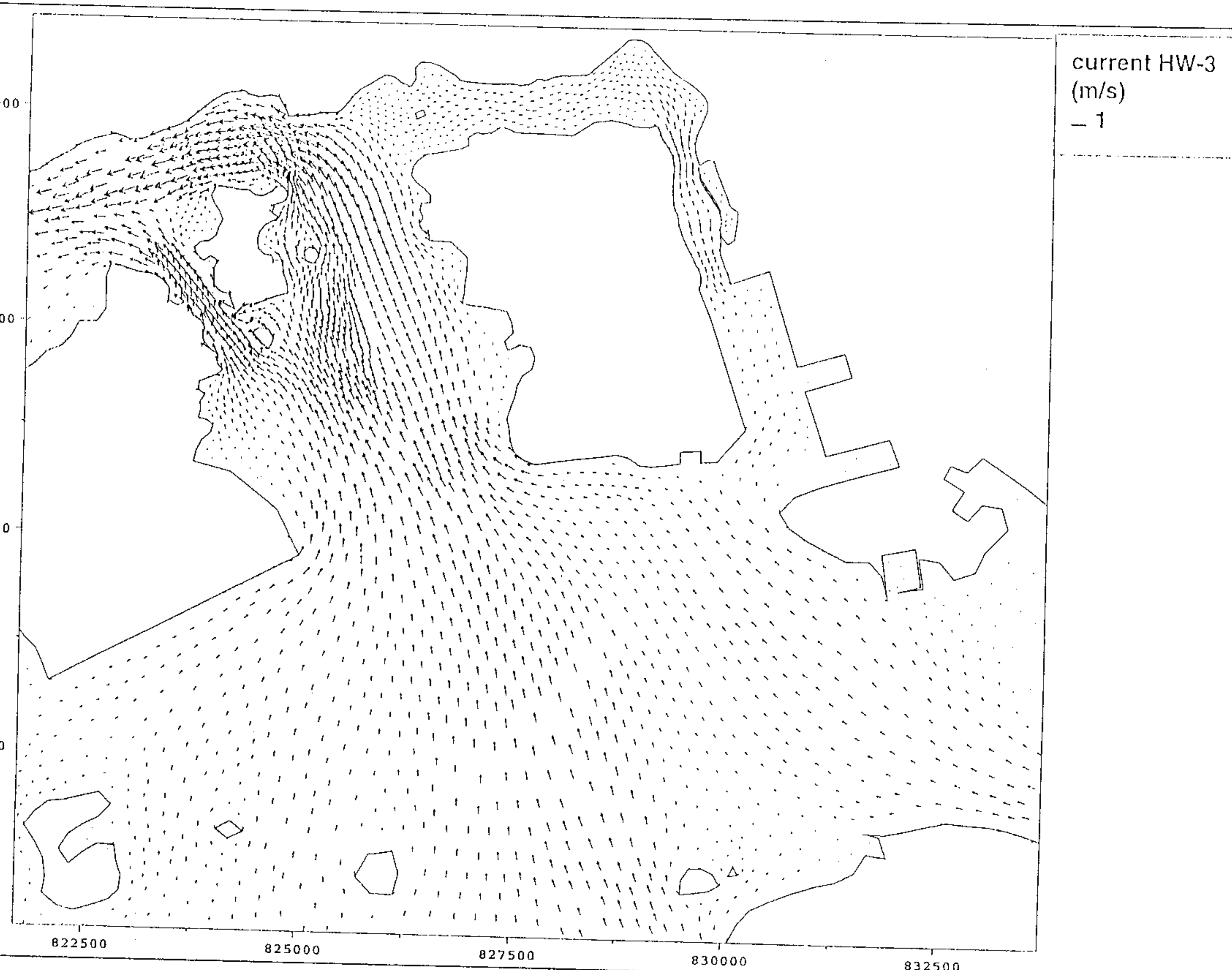

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
DIFFERENCE IN DEPTH-MEAN CURRENT SPEED, PEAK EBB, DRY SEASON SPRING TIDE

FIGURE 53



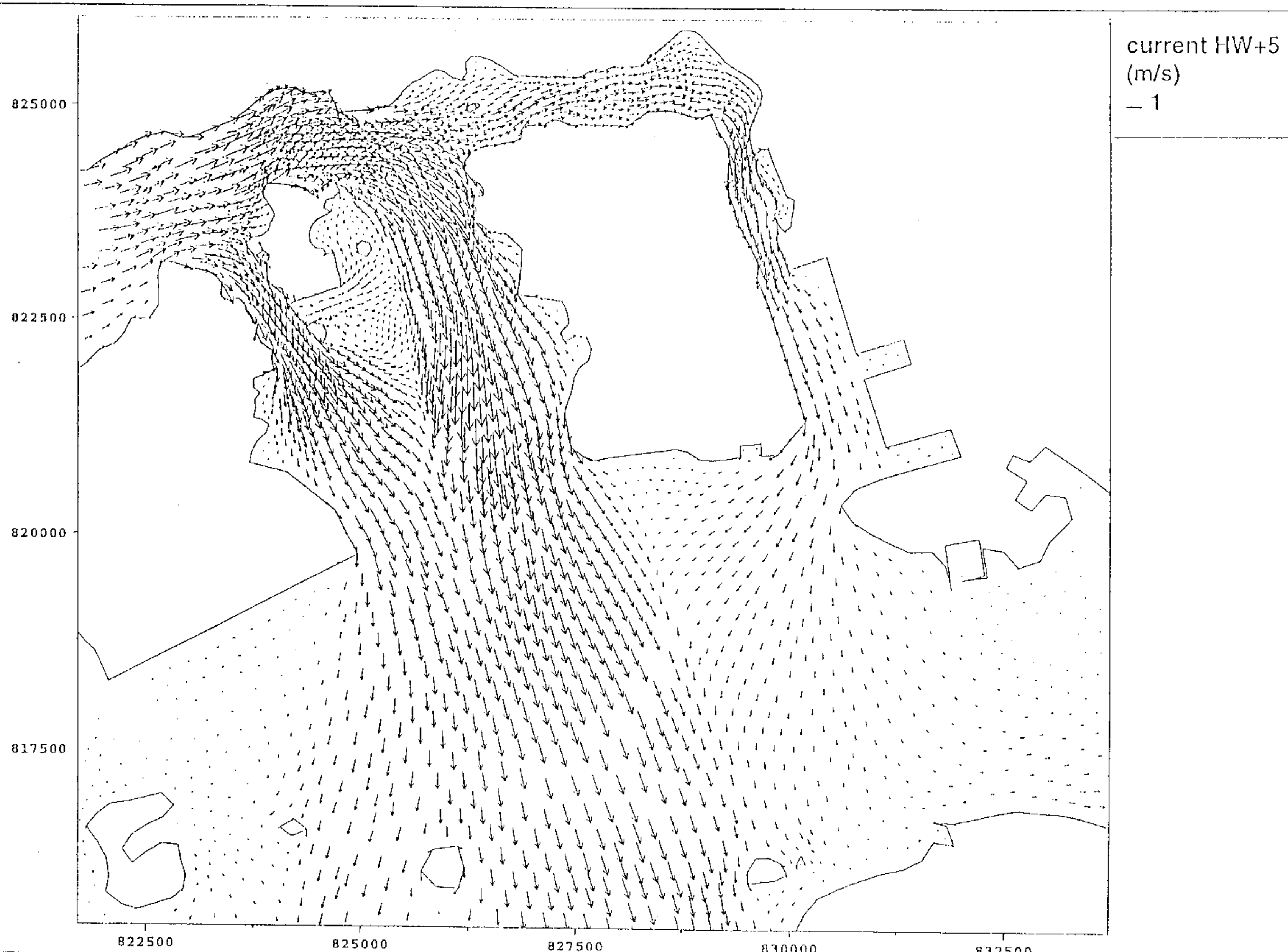

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK FLOOD VECTORS, WET SEASON SPRING TIDE, SURFACE (LARGE VIEW)

FIGURE 54




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK FLOOD VECTORS, WET SEASON SPRING TIDE, MID-DEPTH (LARGE VIEW)

FIGURE 55

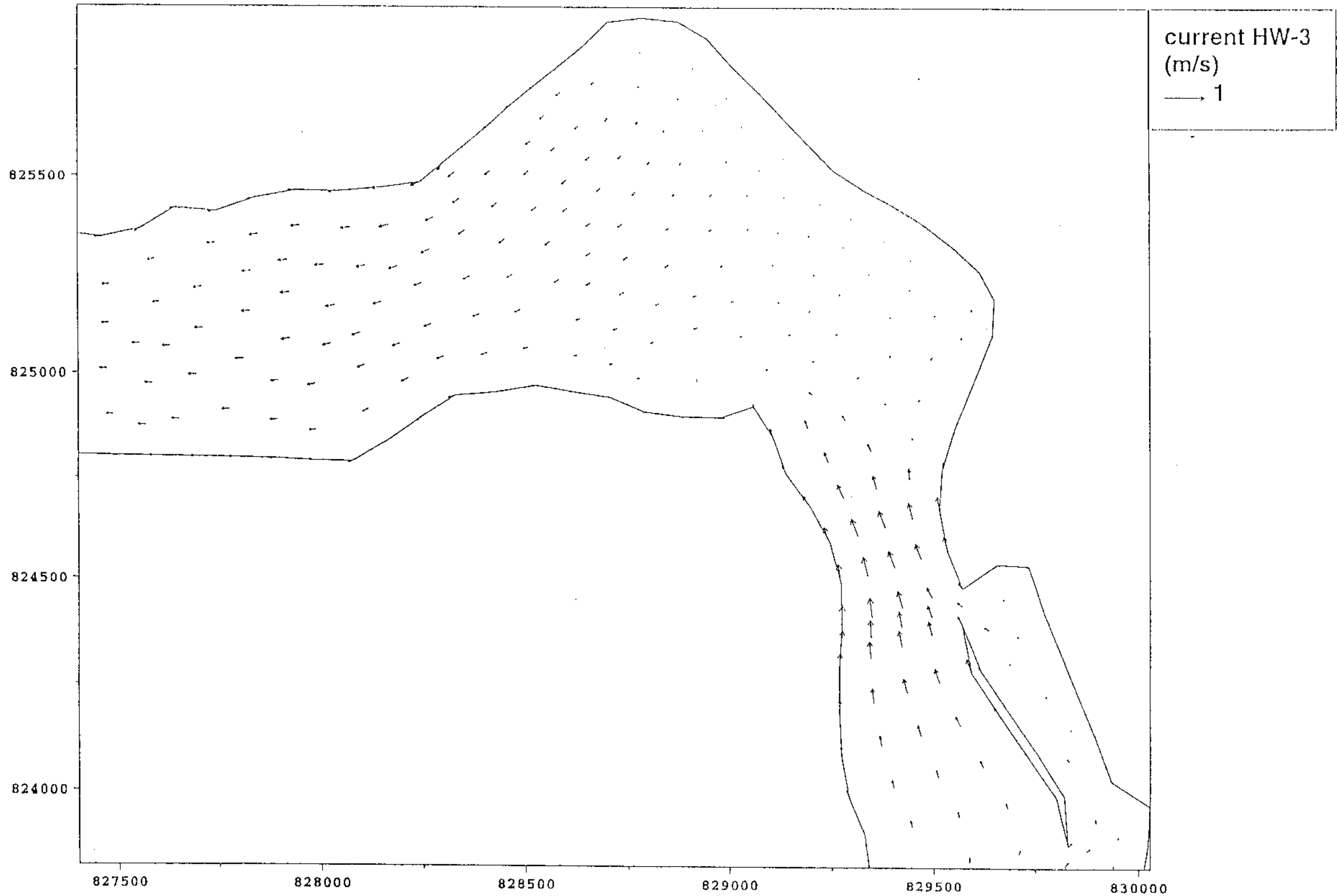



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK EBB VECTORS, WET SEASON SPRING TIDE, SURFACE (LARGE VIEW)

FIGURE 56

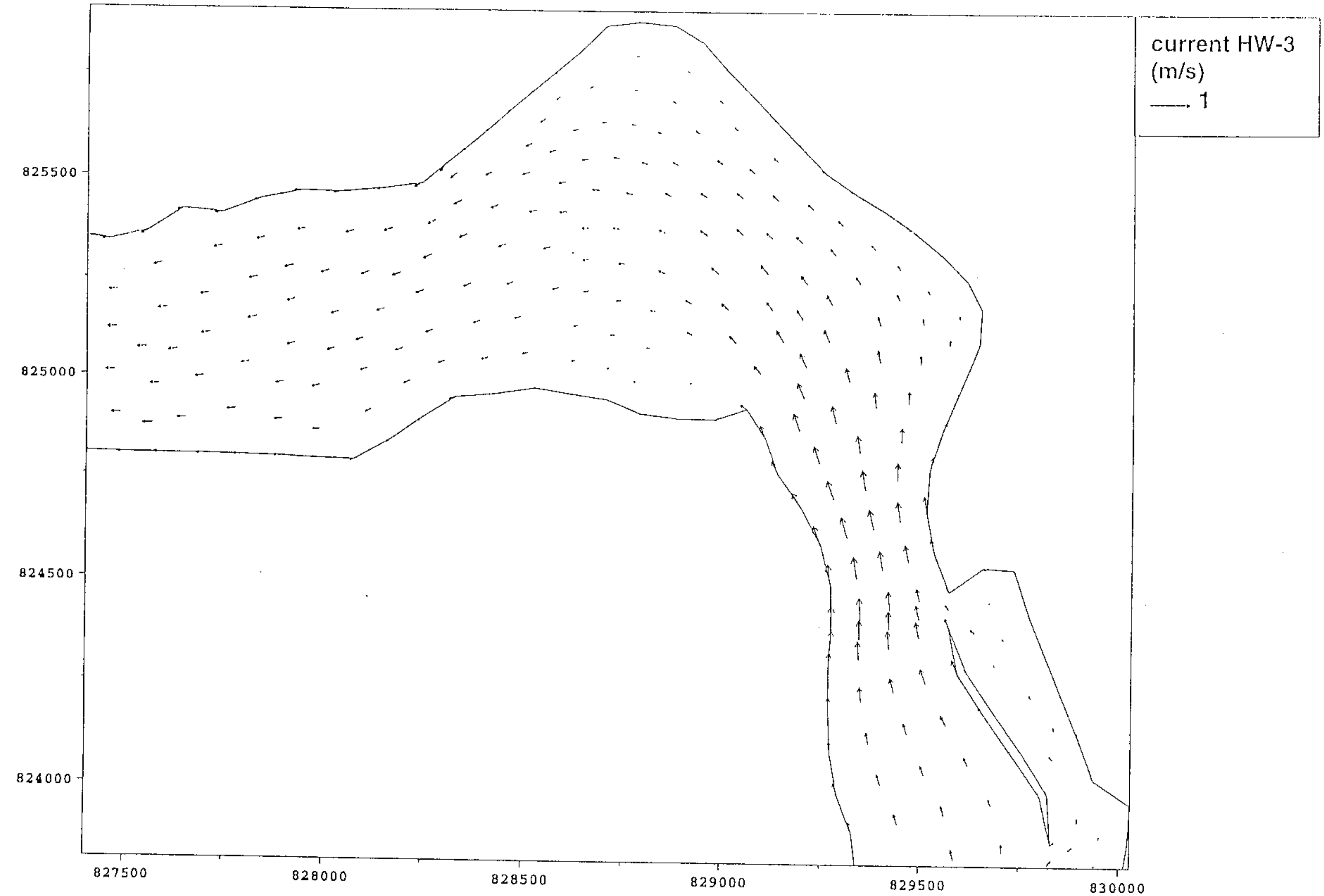

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK EBB VECTORS, WET SEASON SPRING TIDE, MID-DEPTH (LARGE VIEW)

FIGURE 57



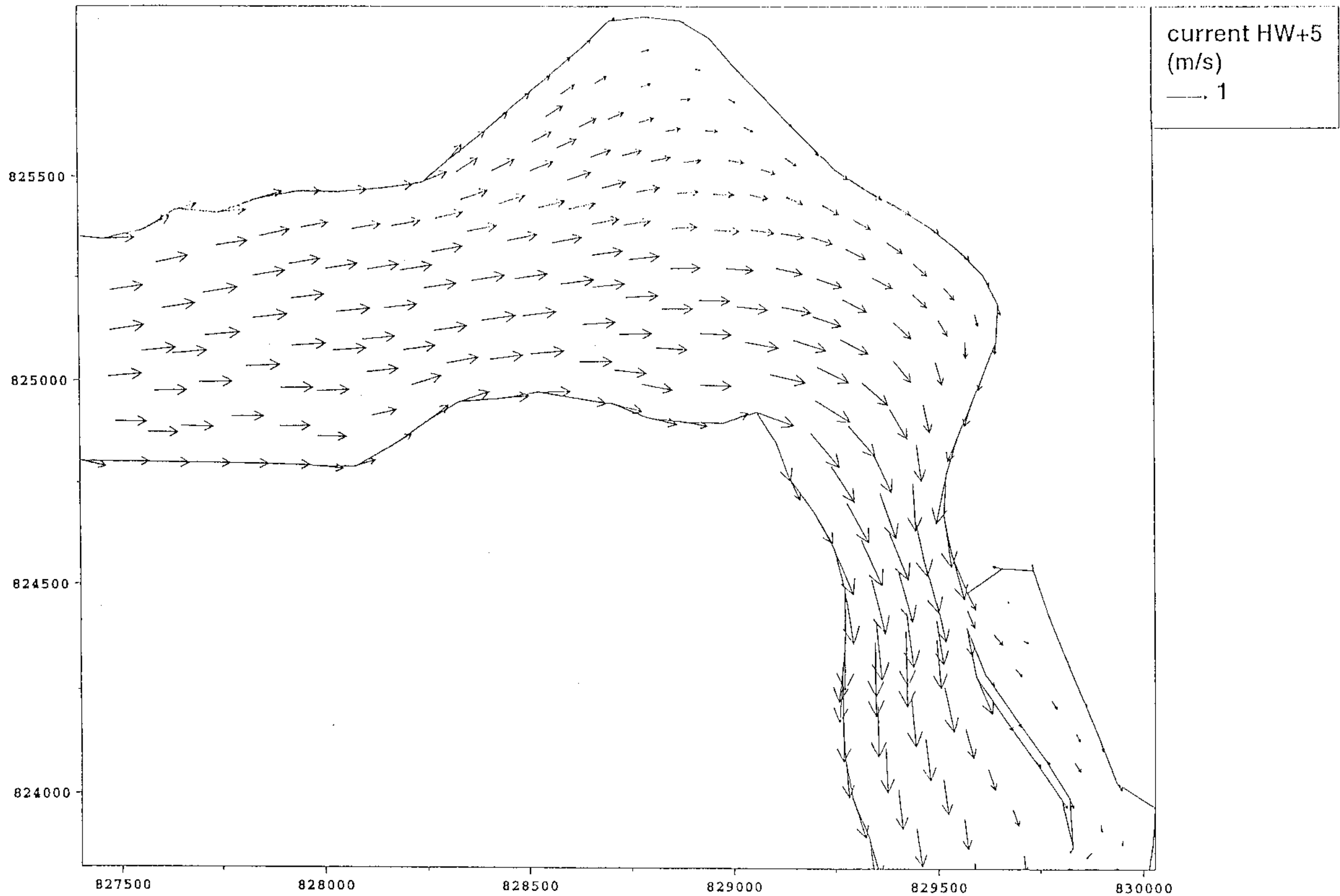

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK FLOOD VECTORS, WET SEASON SPRING TIDE, SURFACE (TSUEN WAN BAY)

FIGURE 58



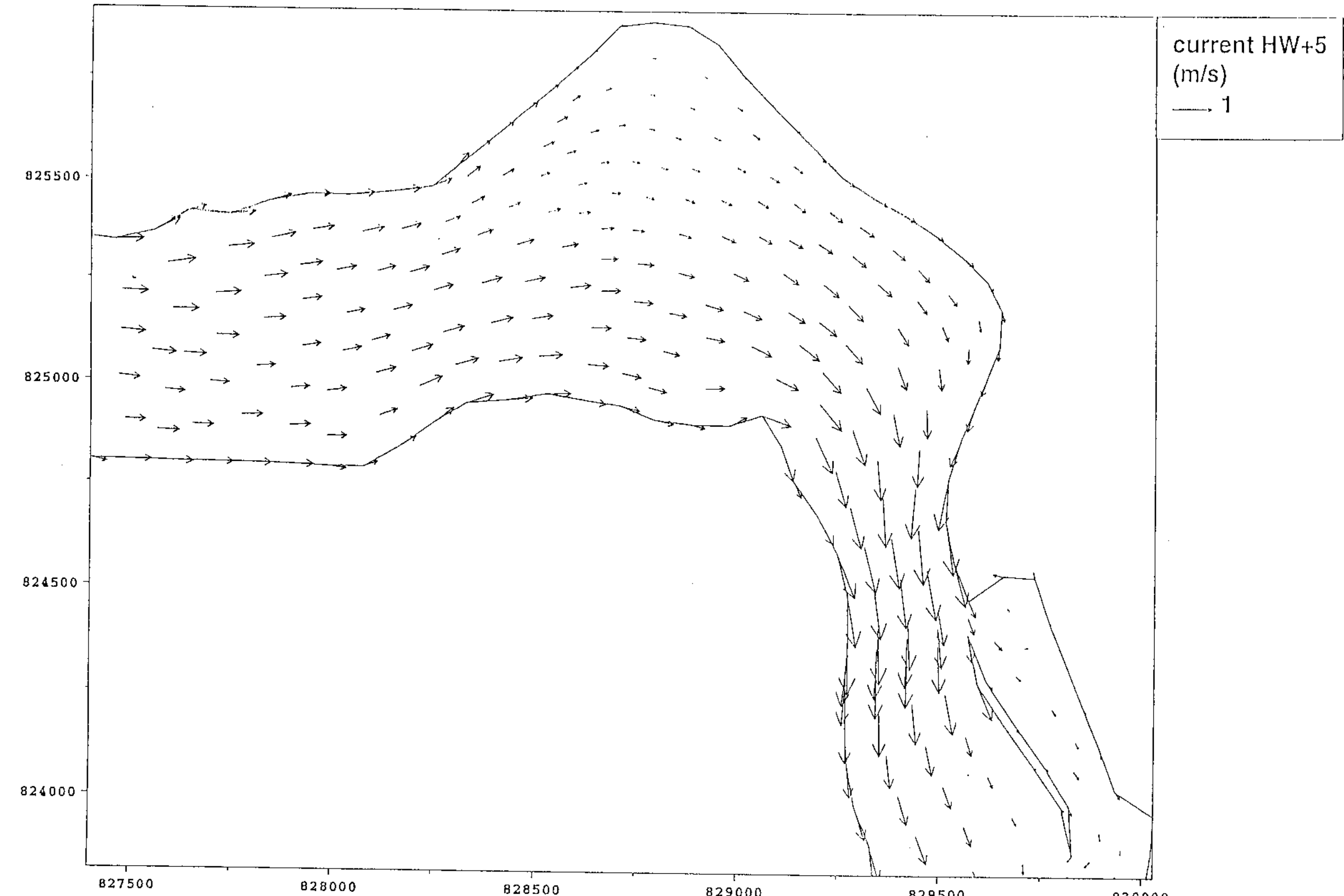

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK FLOOD VECTORS, WET SEASON SPRING TIDE, MID-DEPTH (TSUEN WAN BAY)

FIGURE 59



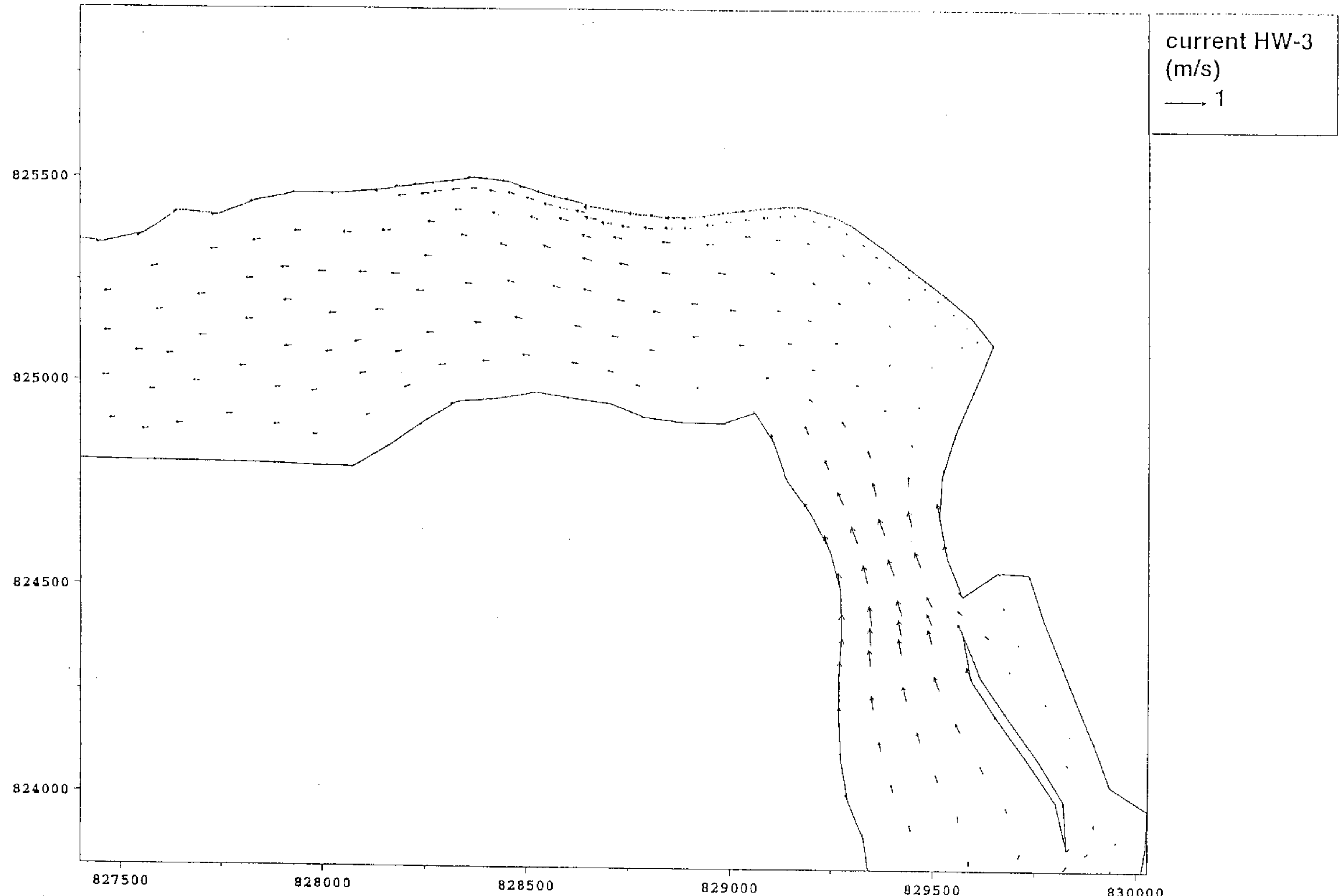

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK EBB VECTORS, WET SEASON SPRING TIDE, SURFACE (TSUEN WAN BAY)

FIGURE 60



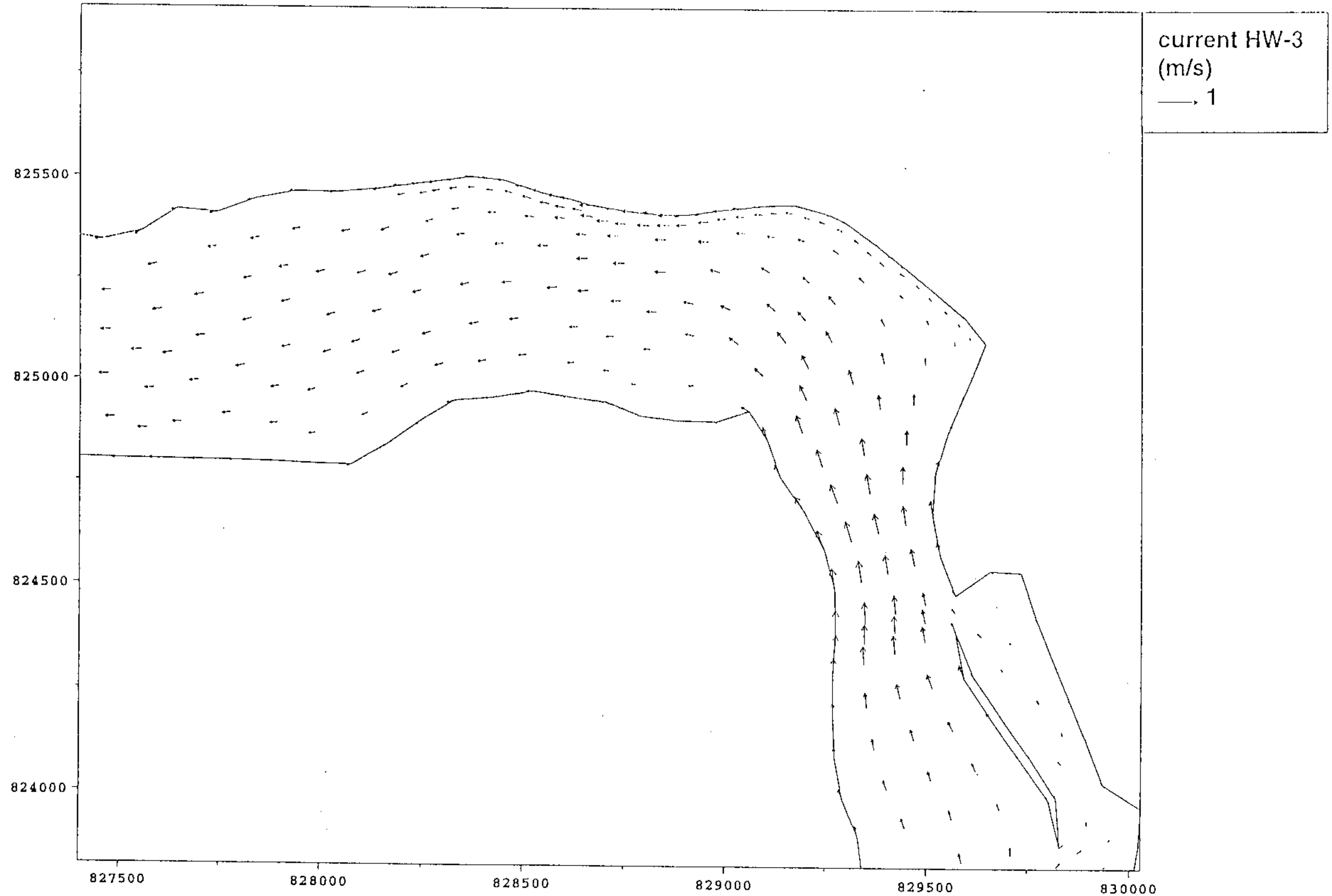

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK EBB VECTORS, WET SEASON SPRING TIDE, MID-DEPTH (TSUEN WAN BAY)

FIGURE 61



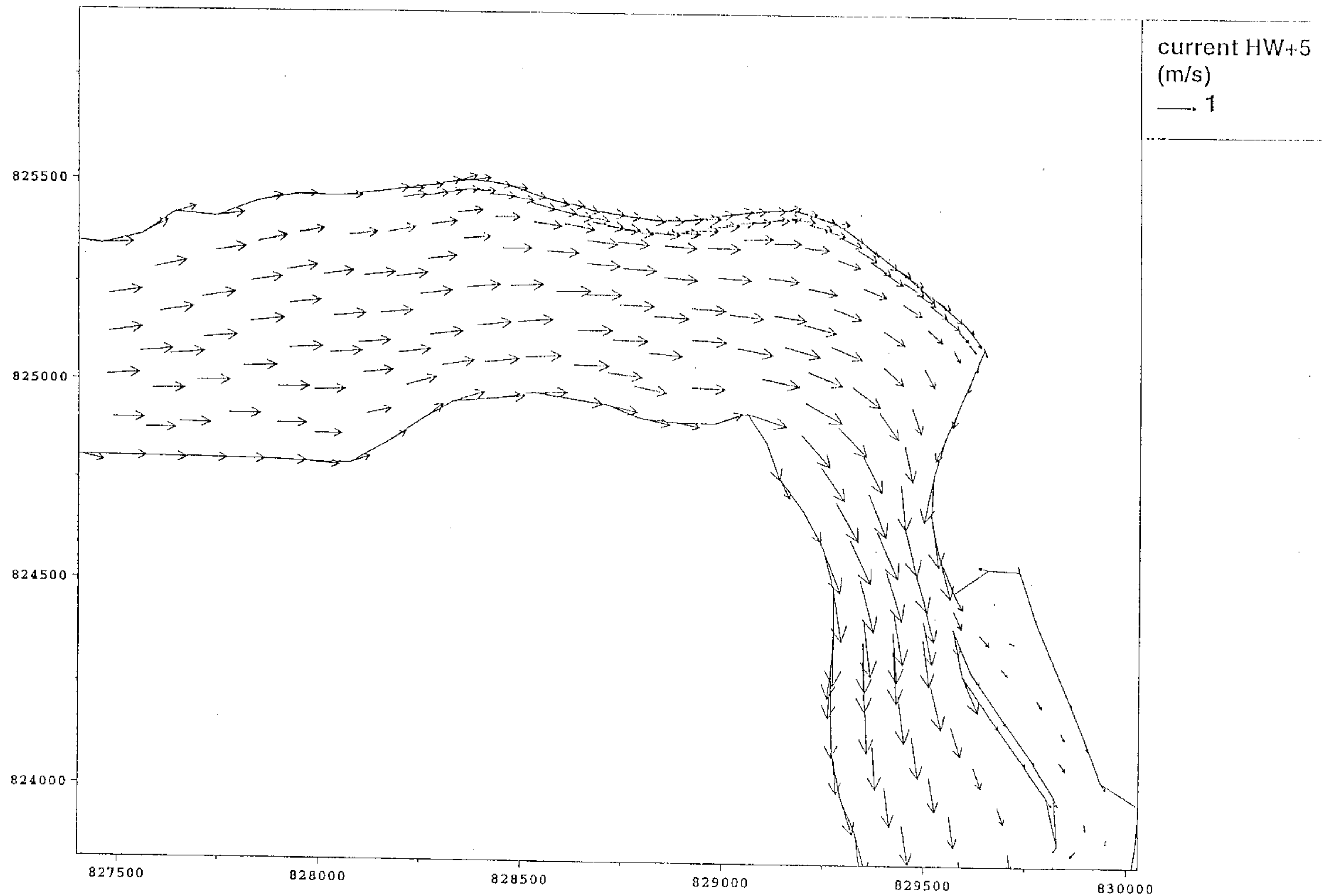

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
COMPLETED, PEAK FLOOD VECTORS, WET SEASON SPRING TIDE, SURFACE (TSUEN WAN BAY)

FIGURE 62



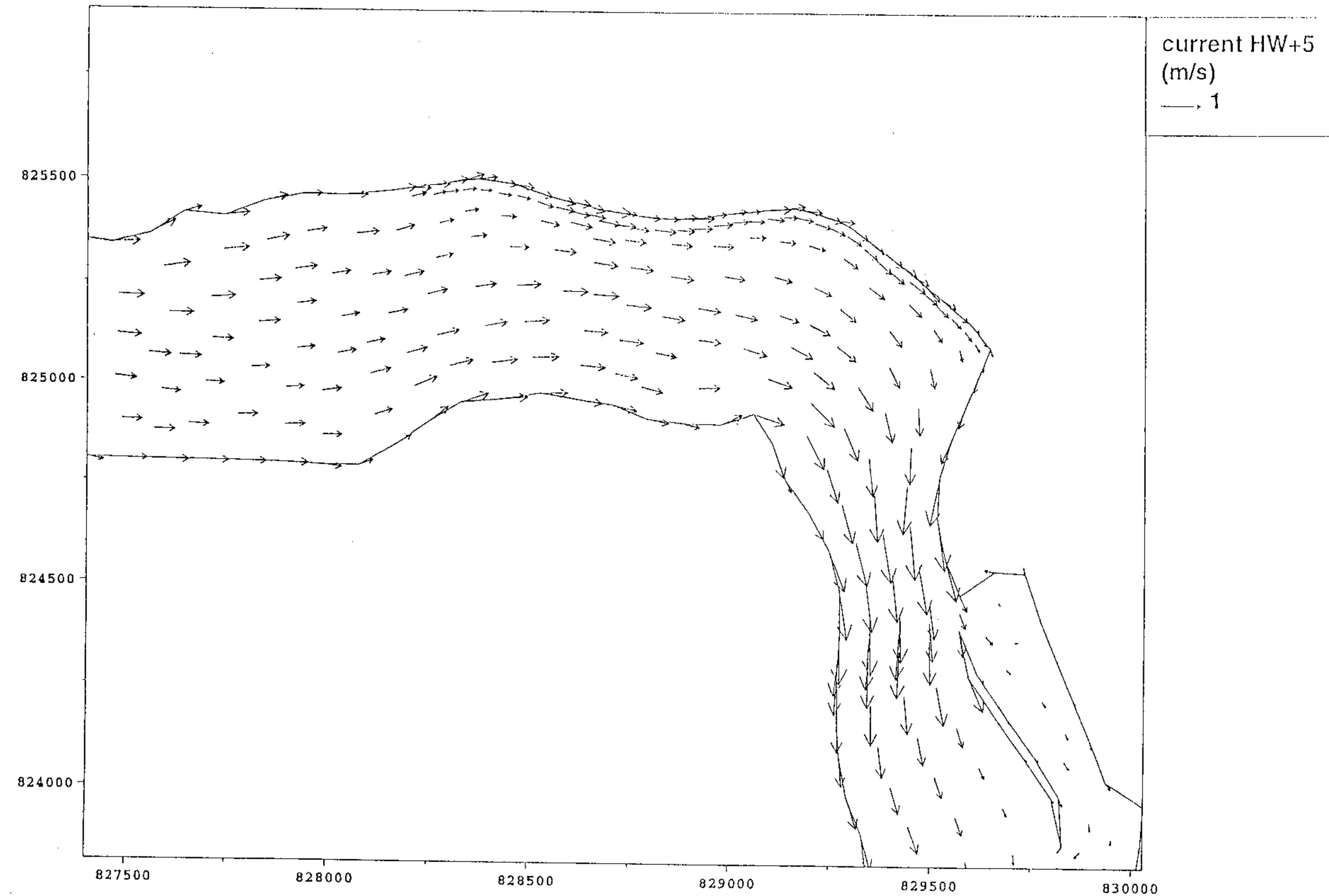

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
COMPLETED, PEAK FLOOD VECTORS, WET SEASON SPRING TIDE, MID-DEPTH (TSUEN WAN BAY)

FIGURE 63



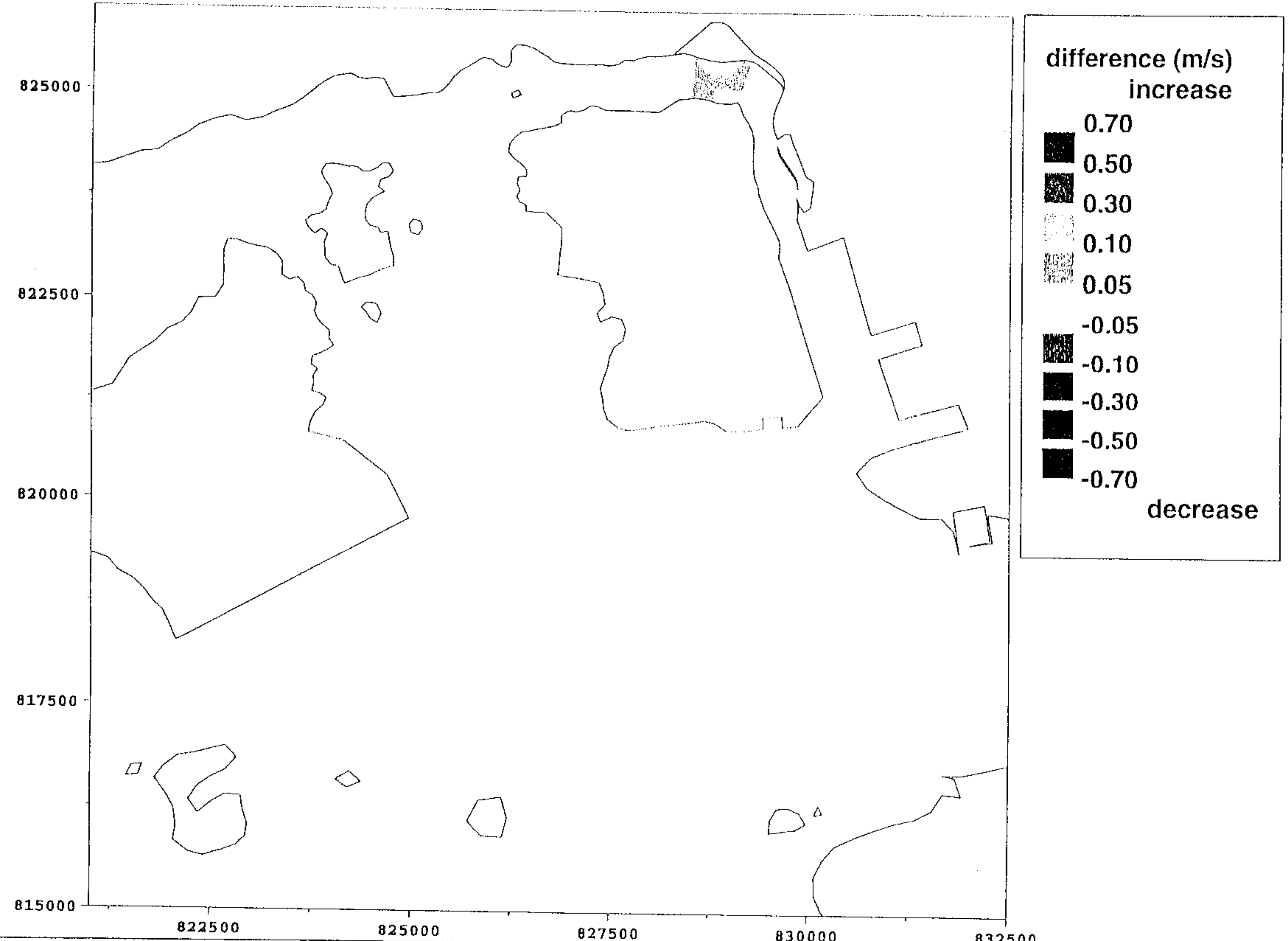

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
COMPLETED, PEAK EBB VECTORS, WET SEASON SPRING TIDE, SURFACE (TSUEN WAN BAY)

FIGURE 64



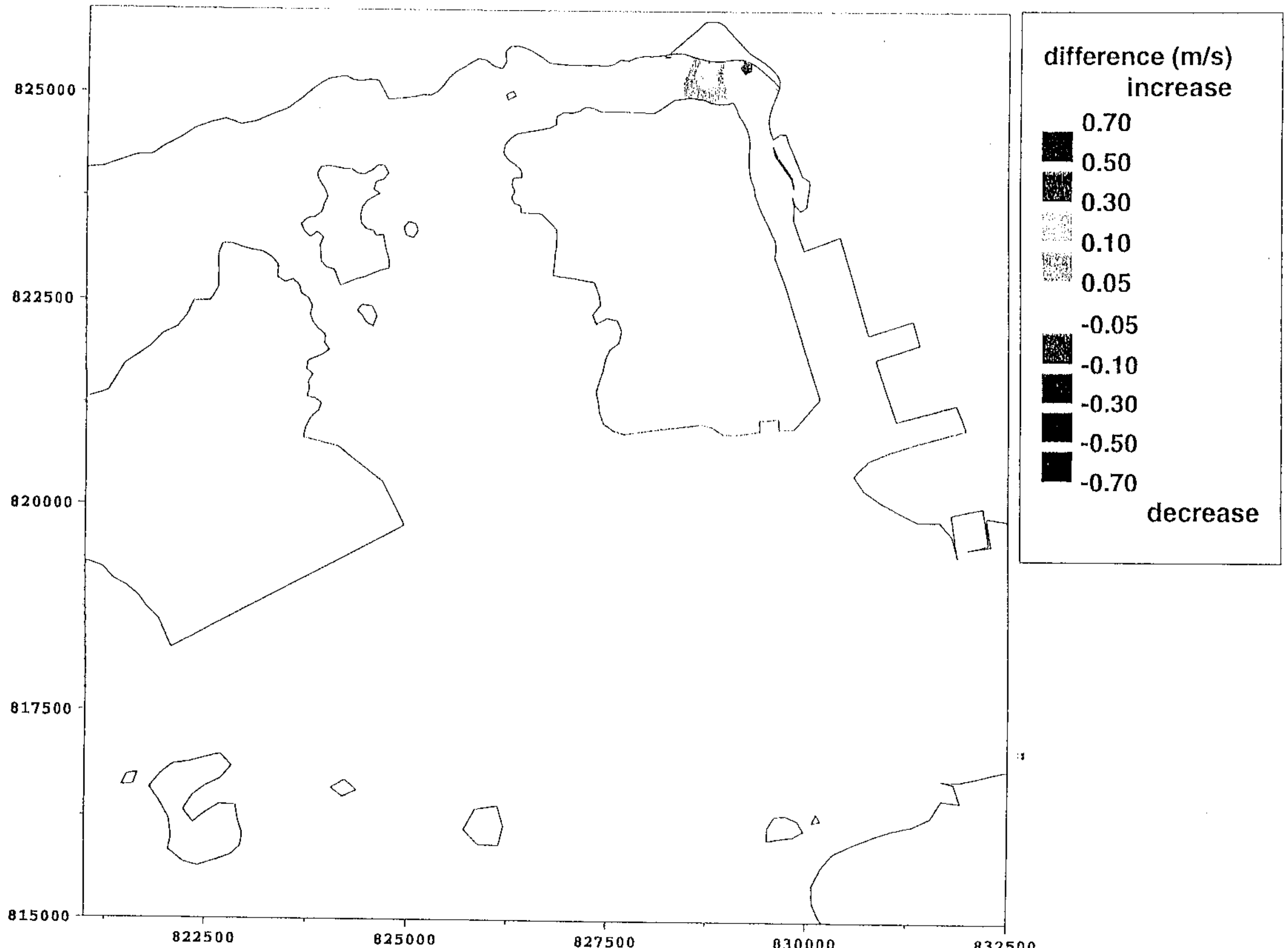

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
COMPLETED, PEAK EBB VECTORS, WET SEASON SPRING TIDE, MID-DEPTH (TSUEN WAN BAY)

FIGURE 65



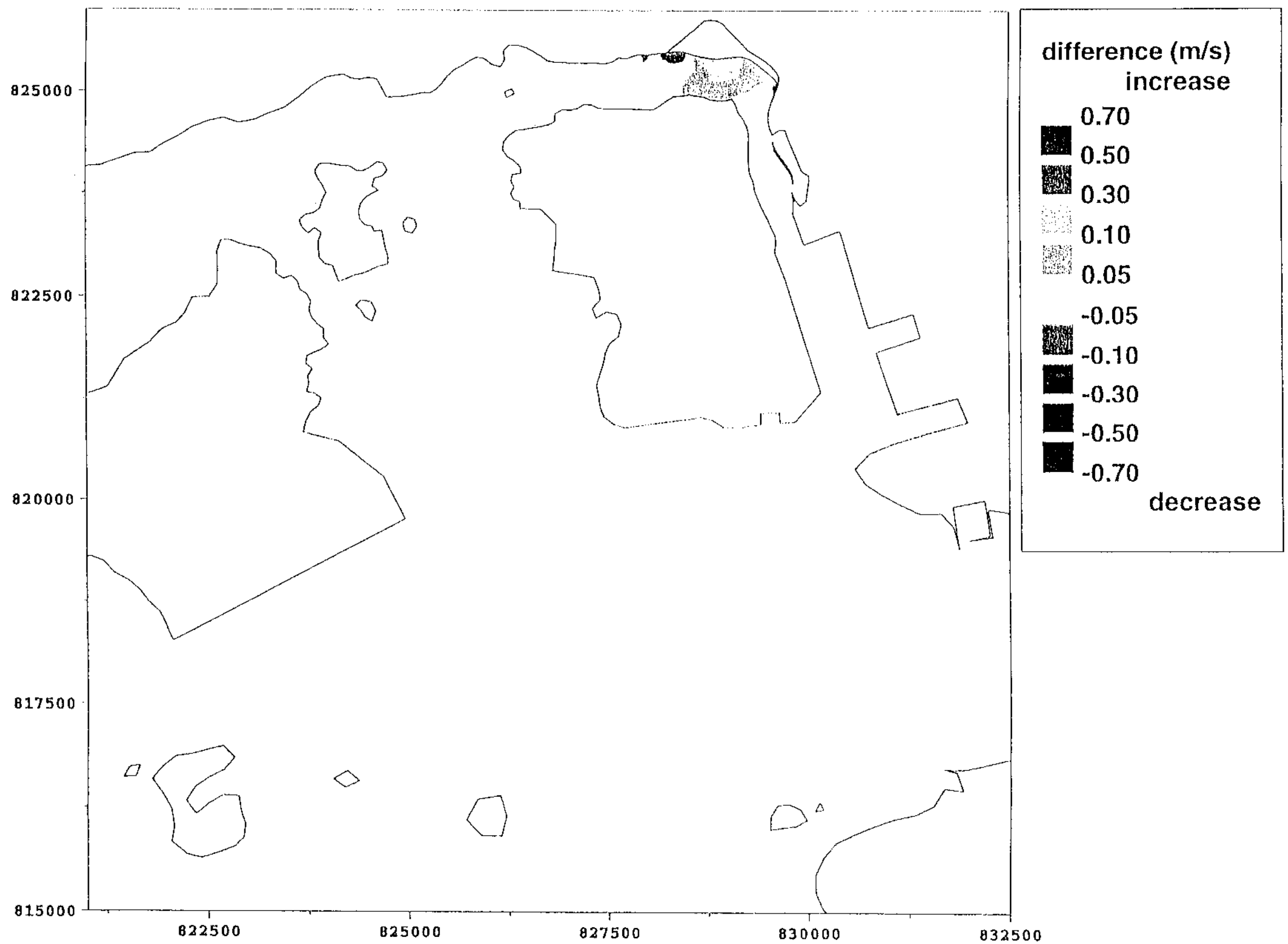

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
DIFFERENCE IN SURFACE CURRENT SPEED, PEAK FLOOD, WET SEASON SPRING TIDE

FIGURE 66



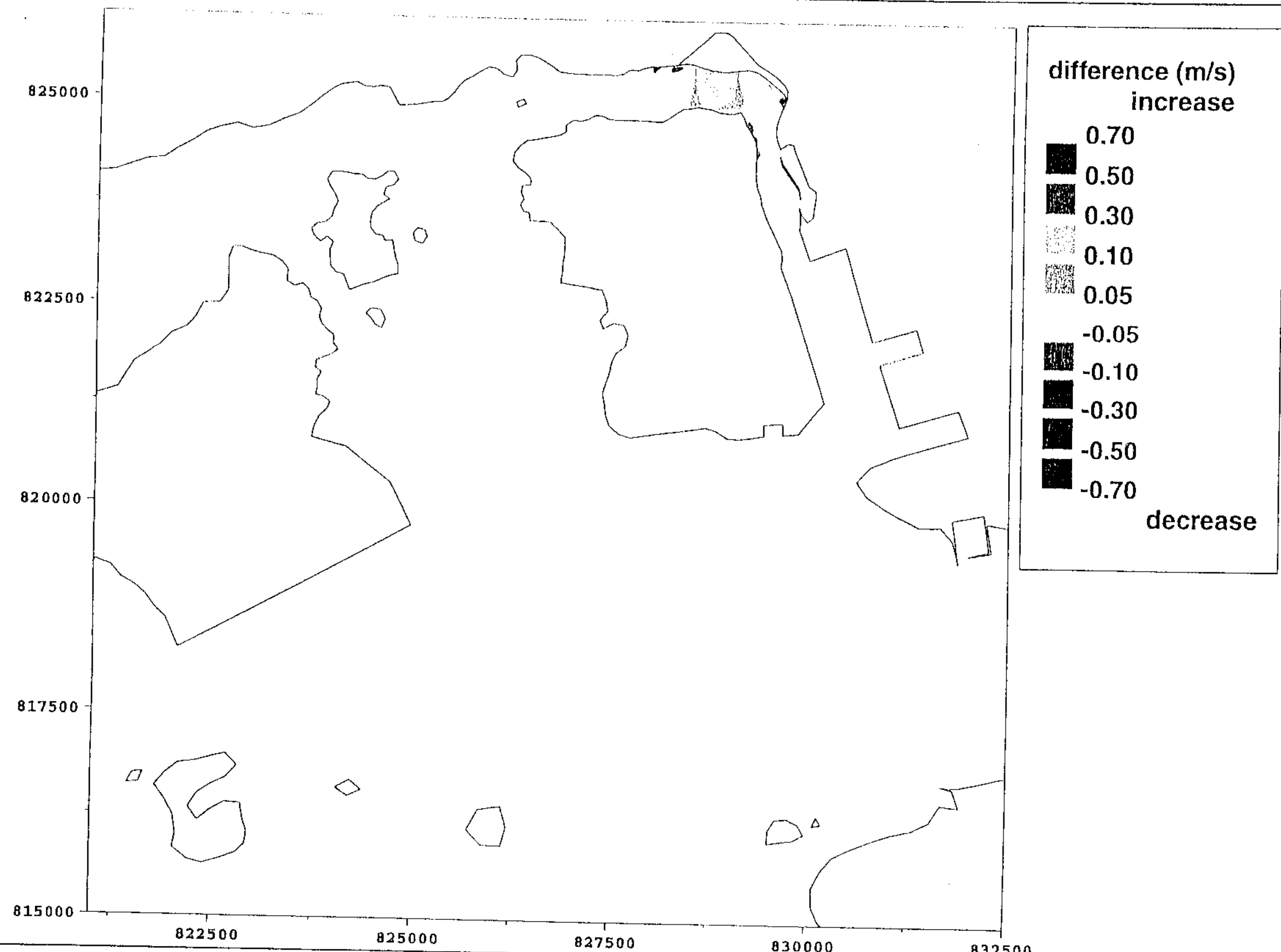

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
DIFFERENCE IN MID-DEPTH CURRENT SPEED, PEAK FLOOD, WET SEASON SPRING TIDE

FIGURE 67



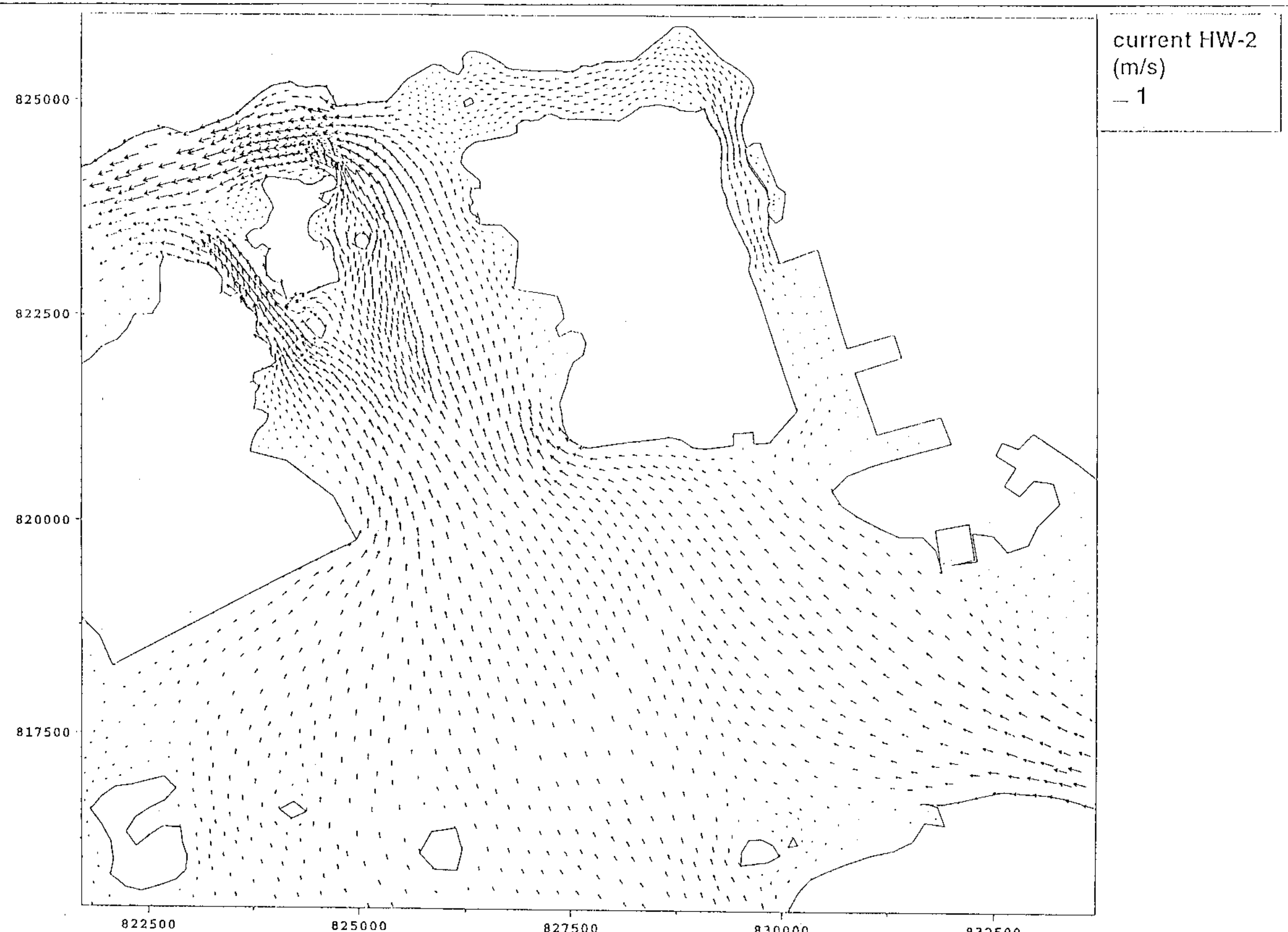

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
DIFFERENCE IN SURFACE CURRENT SPEED, PEAK EBB, WET SEASON SPRING TIDE

FIGURE 68



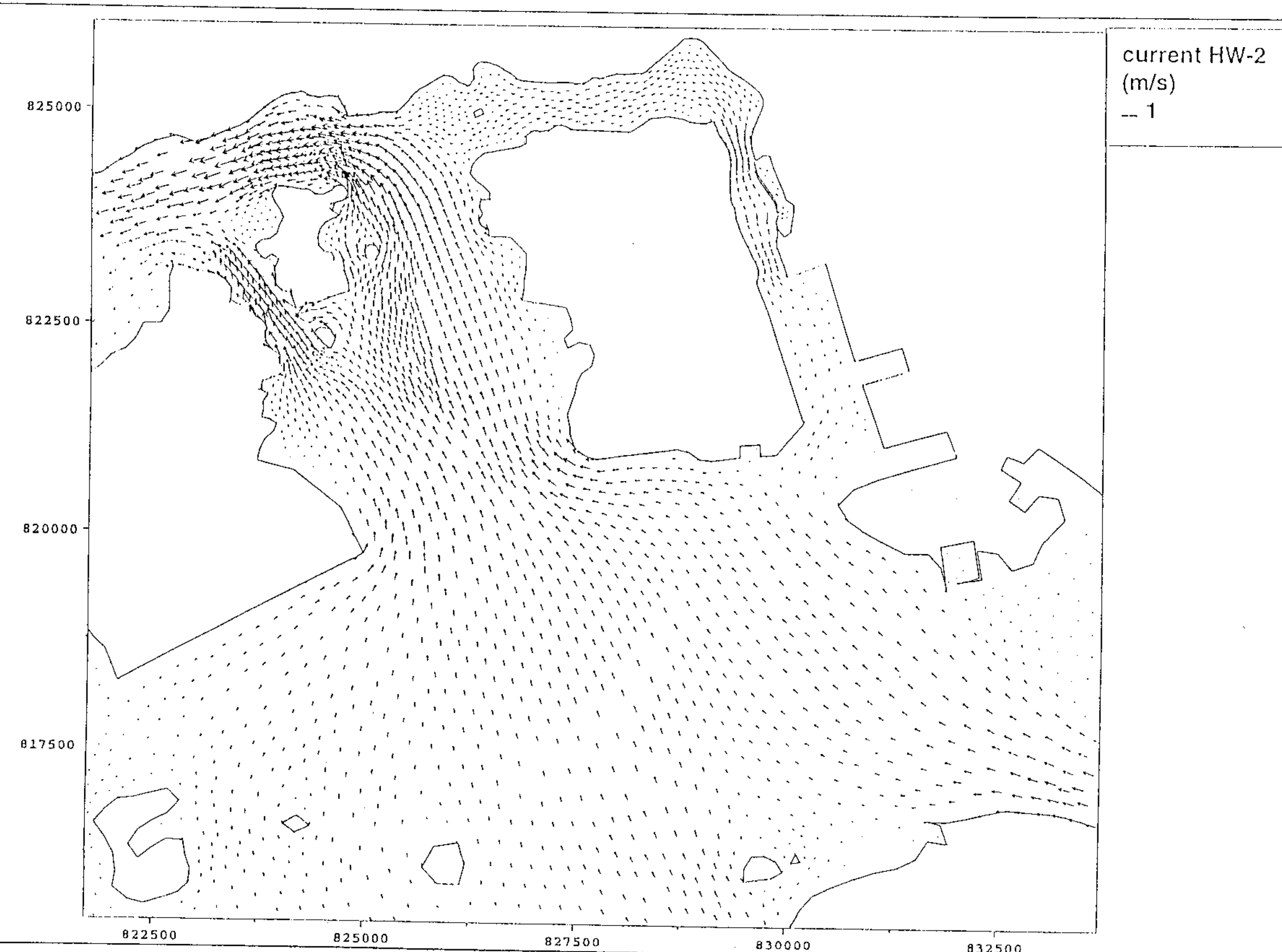

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
DIFFERENCE IN MID-DEPTH CURRENT SPEED, PEAK EBB, WET SEASON SPRING TIDE

FIGURE 69



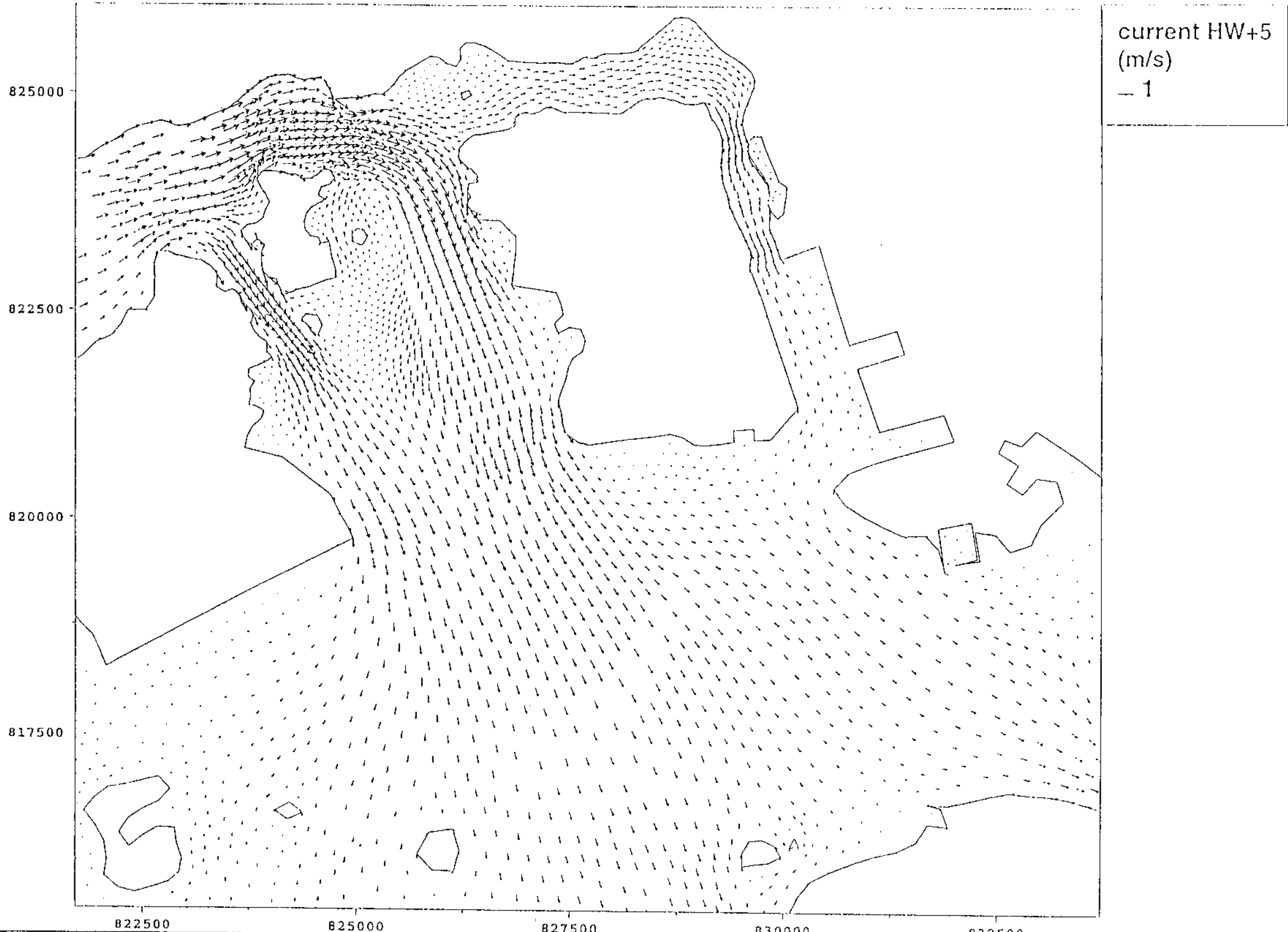

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK FLOOD VECTORS, DRY SEASON NEAP TIDE, SURFACE (LARGE VIEW)

FIGURE 70



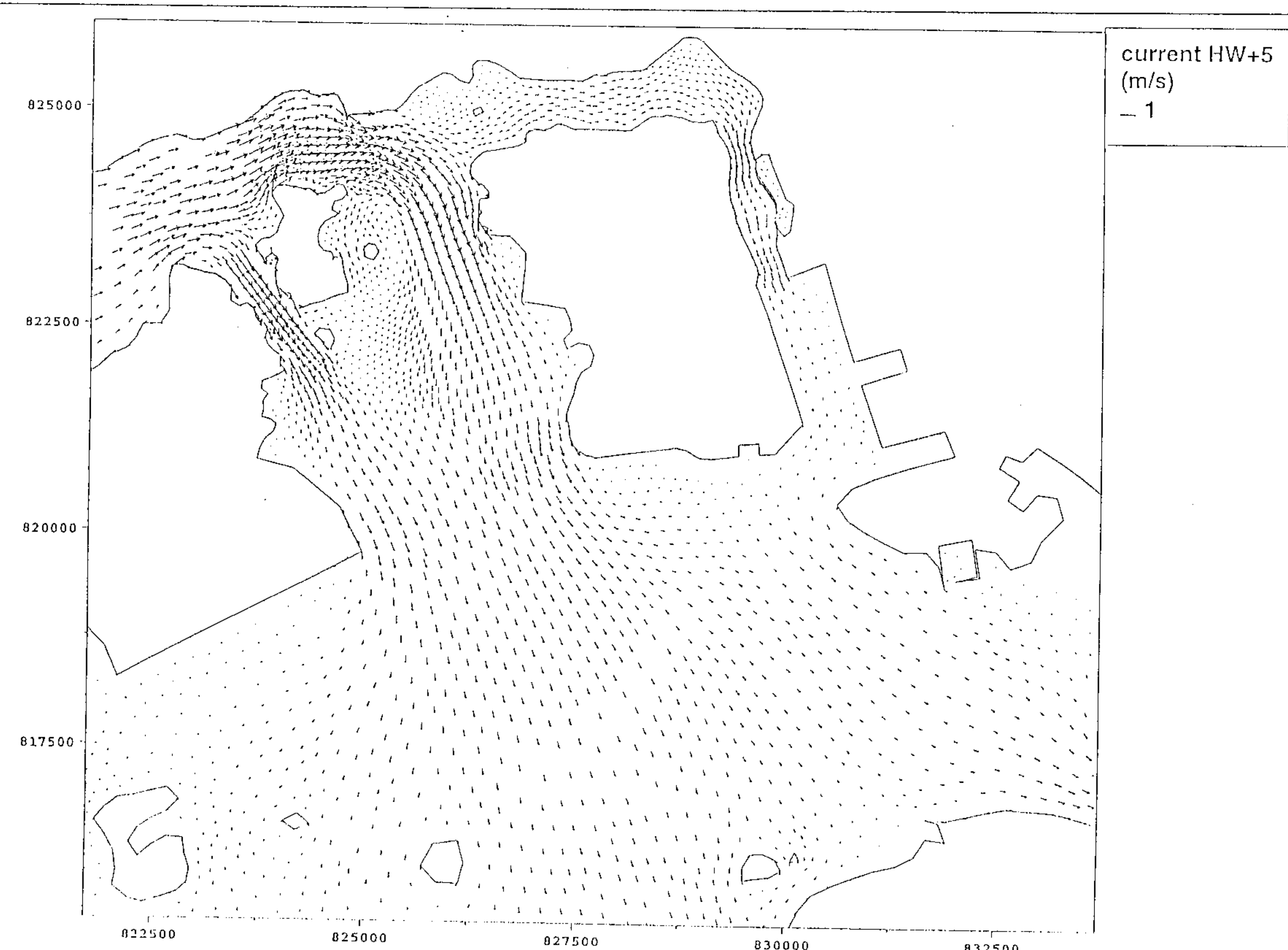

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK FLOOD VECTORS, DRY SEASON NEAP TIDE, MID-DEPTH (LARGE VIEW)

FIGURE 71



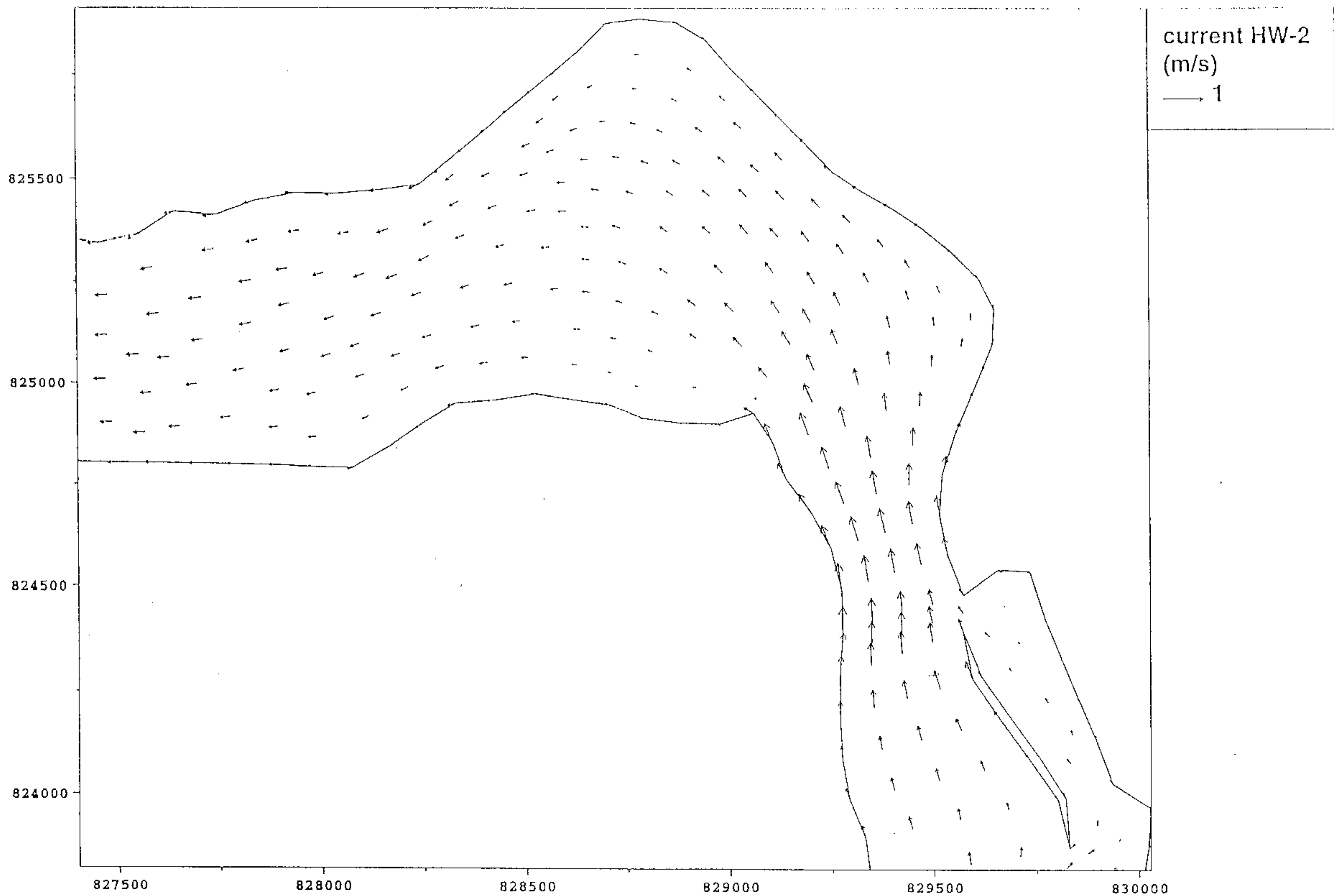

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK EBB VECTORS, DRY SEASON NEAP TIDE, SURFACE (LARGE VIEW)

FIGURE 72



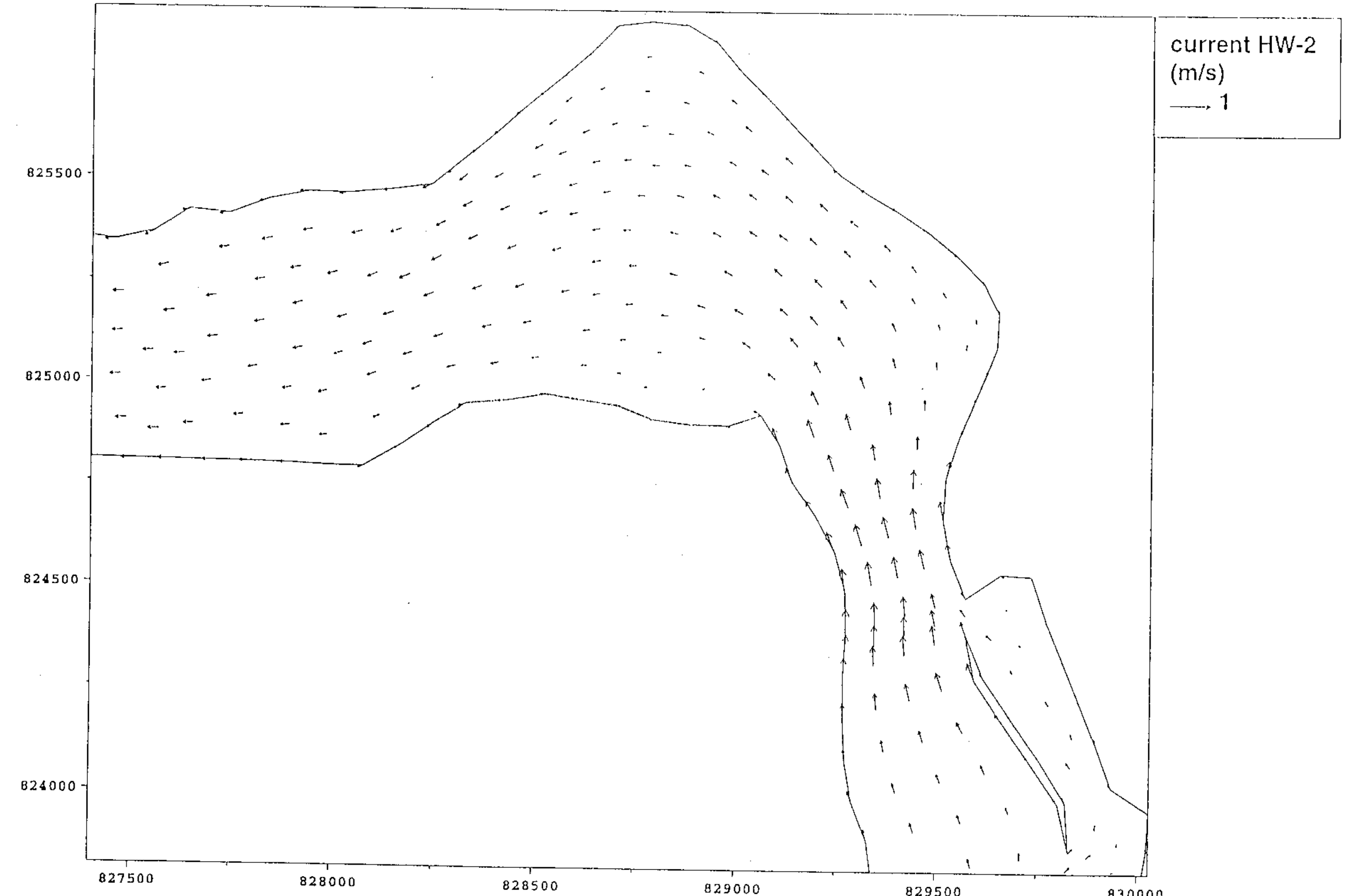

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK EBB VECTORS, DRY SEASON NEAP TIDE, MID-DEPTH (LARGE VIEW)

FIGURE 73



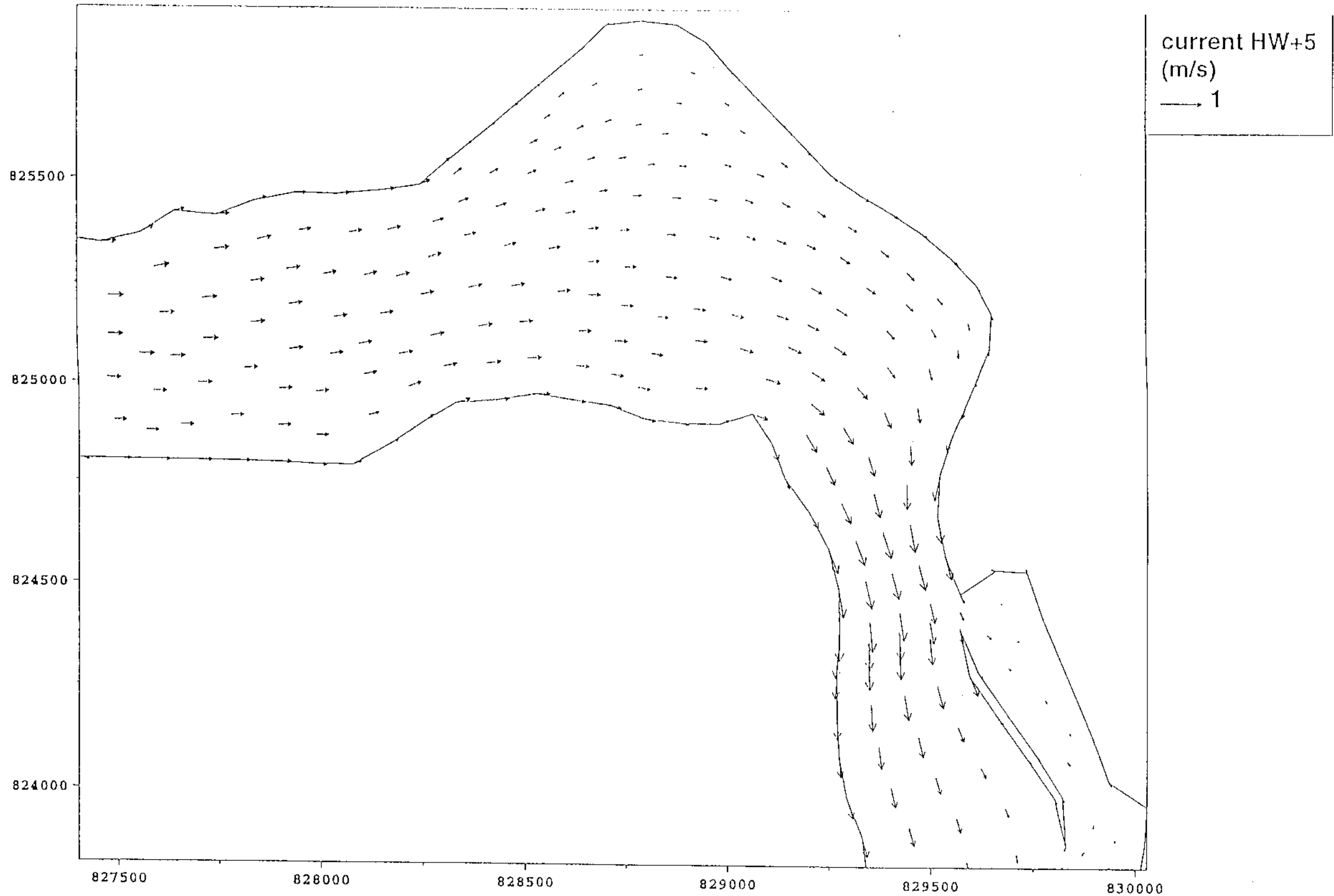

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK FLOOD VECTORS, DRY SEASON NEAP TIDE, SURFACE (TSUEN WAN BAY)

FIGURE 74



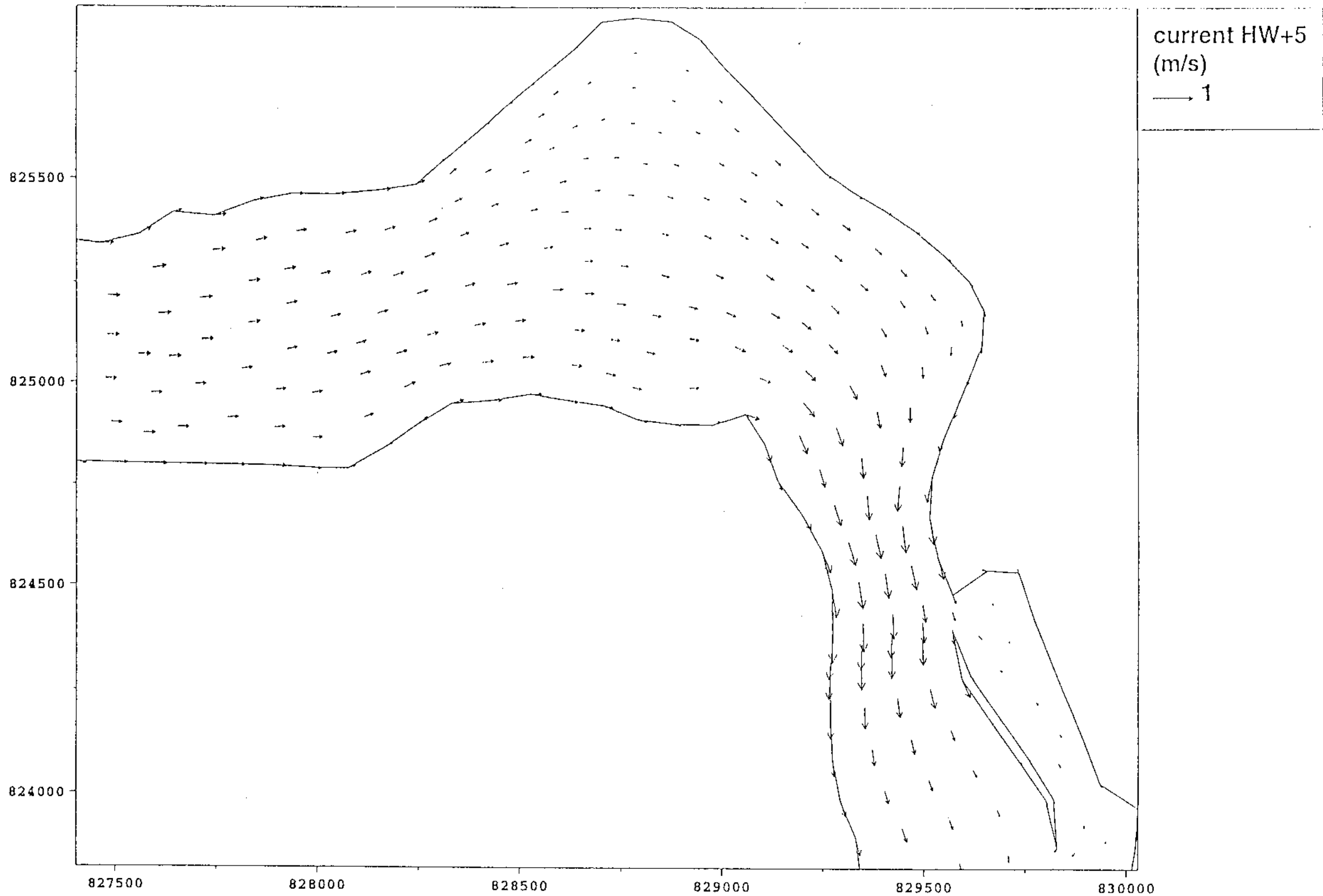

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK FLOOD VECTORS, DRY SEASON NEAP TIDE, MID-DEPTH (TSUEN WAN BAY)

FIGURE 75



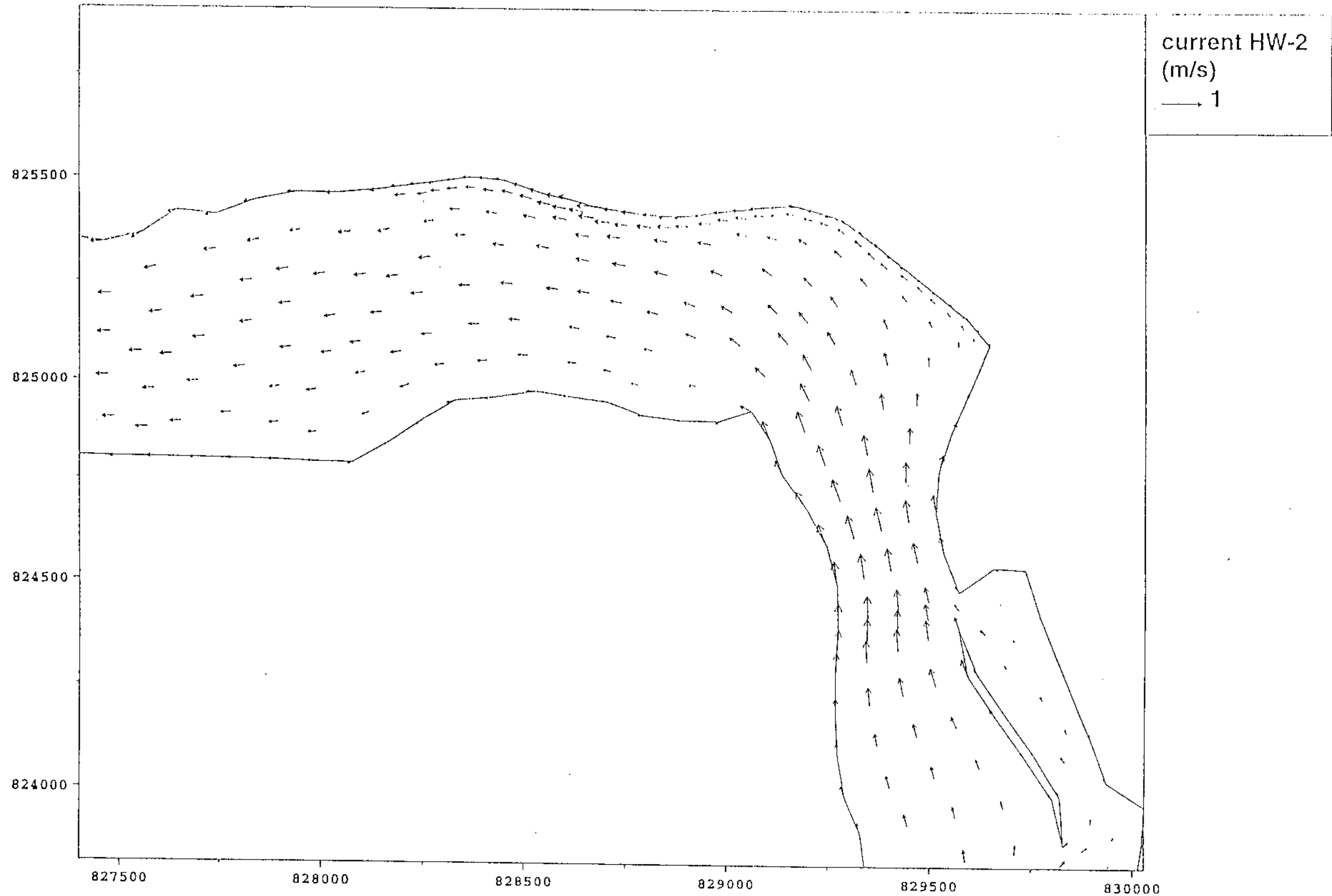

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK EBB VECTORS, DRY SEASON NEAP TIDE, SURFACE (TSUEN WAN BAY)

FIGURE 76



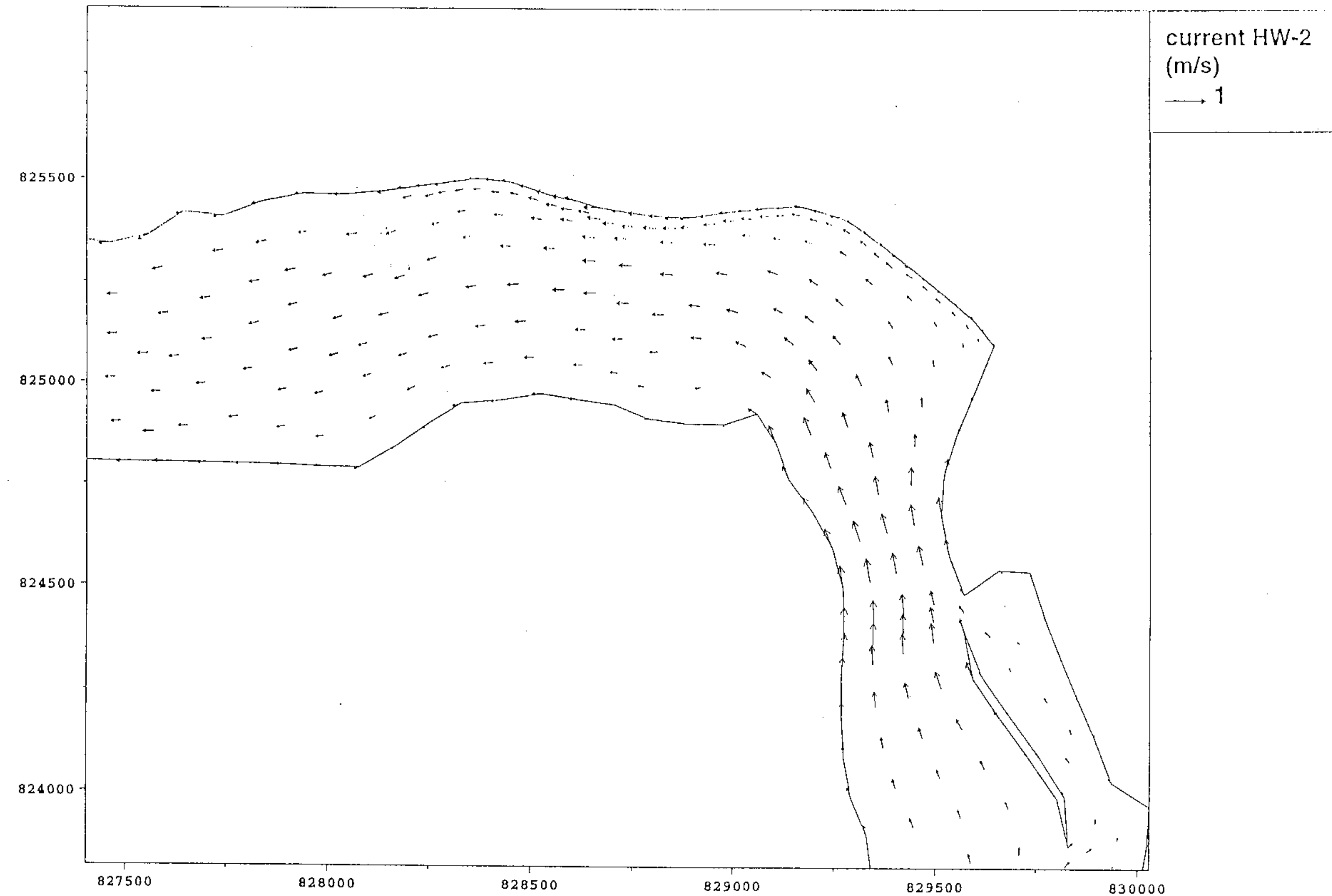

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK EBB VECTORS, DRY SEASON NEAP TIDE, MID-DEPTH (TSUEN WAN BAY)

FIGURE 77



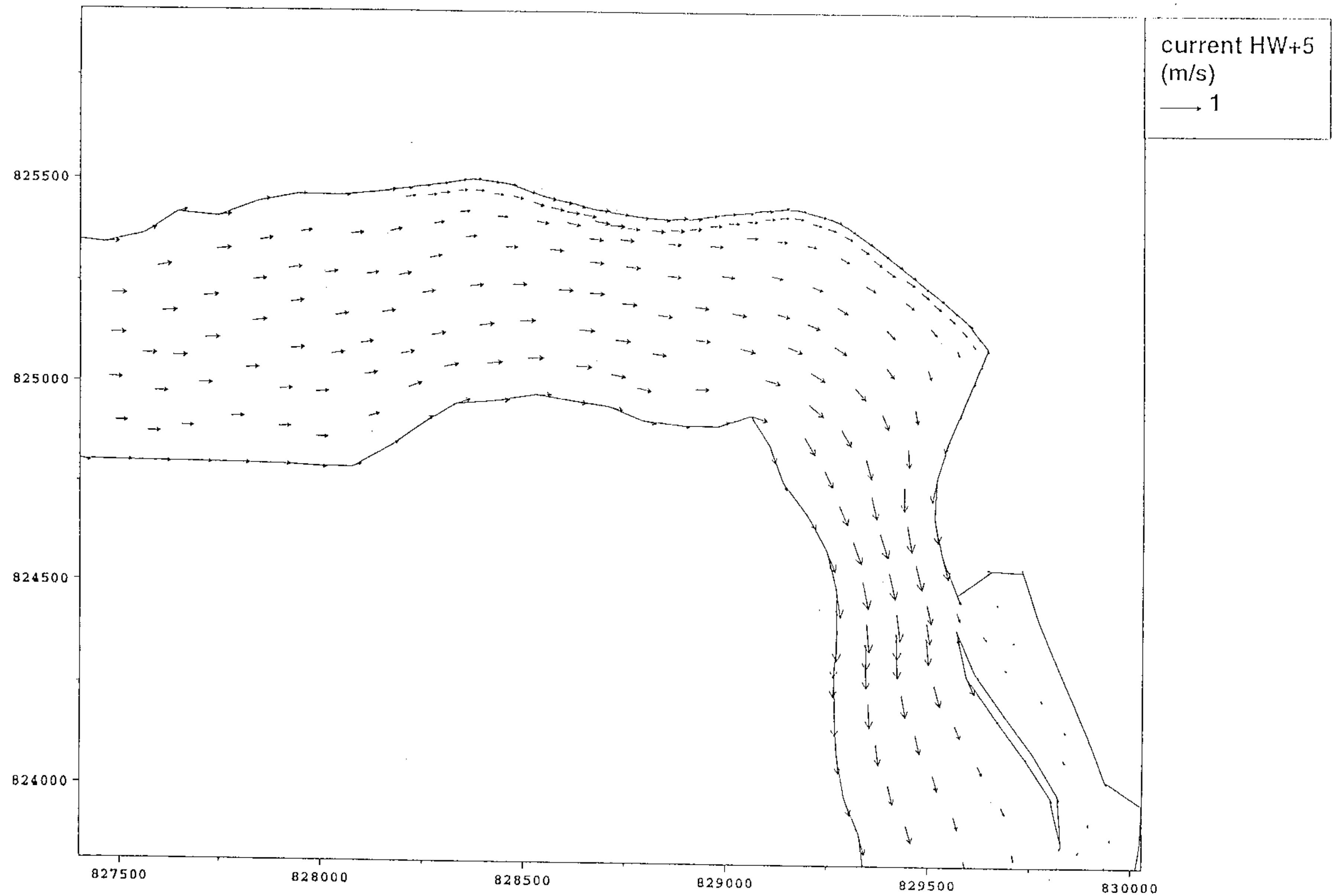

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
COMPLETED, PEAK FLOOD VECTORS, DRY SEASON NEAP TIDE, SURFACE (TSUEN WAN BAY)

FIGURE 78



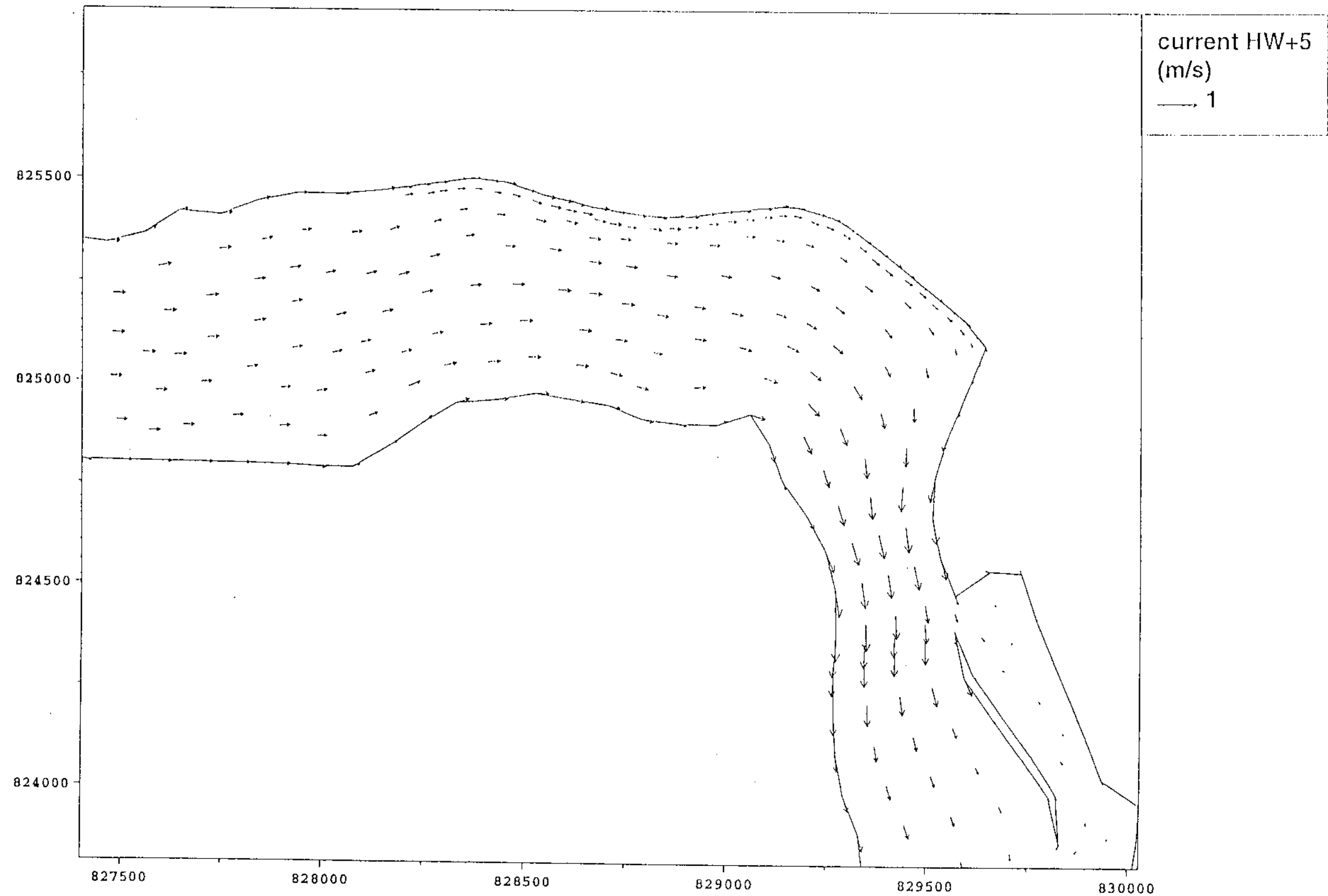

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
COMPLETED, PEAK FLOOD VECTORS, DRY SEASON NEAP TIDE, MID-DEPTH (TSUEN WAN BAY)

FIGURE 79



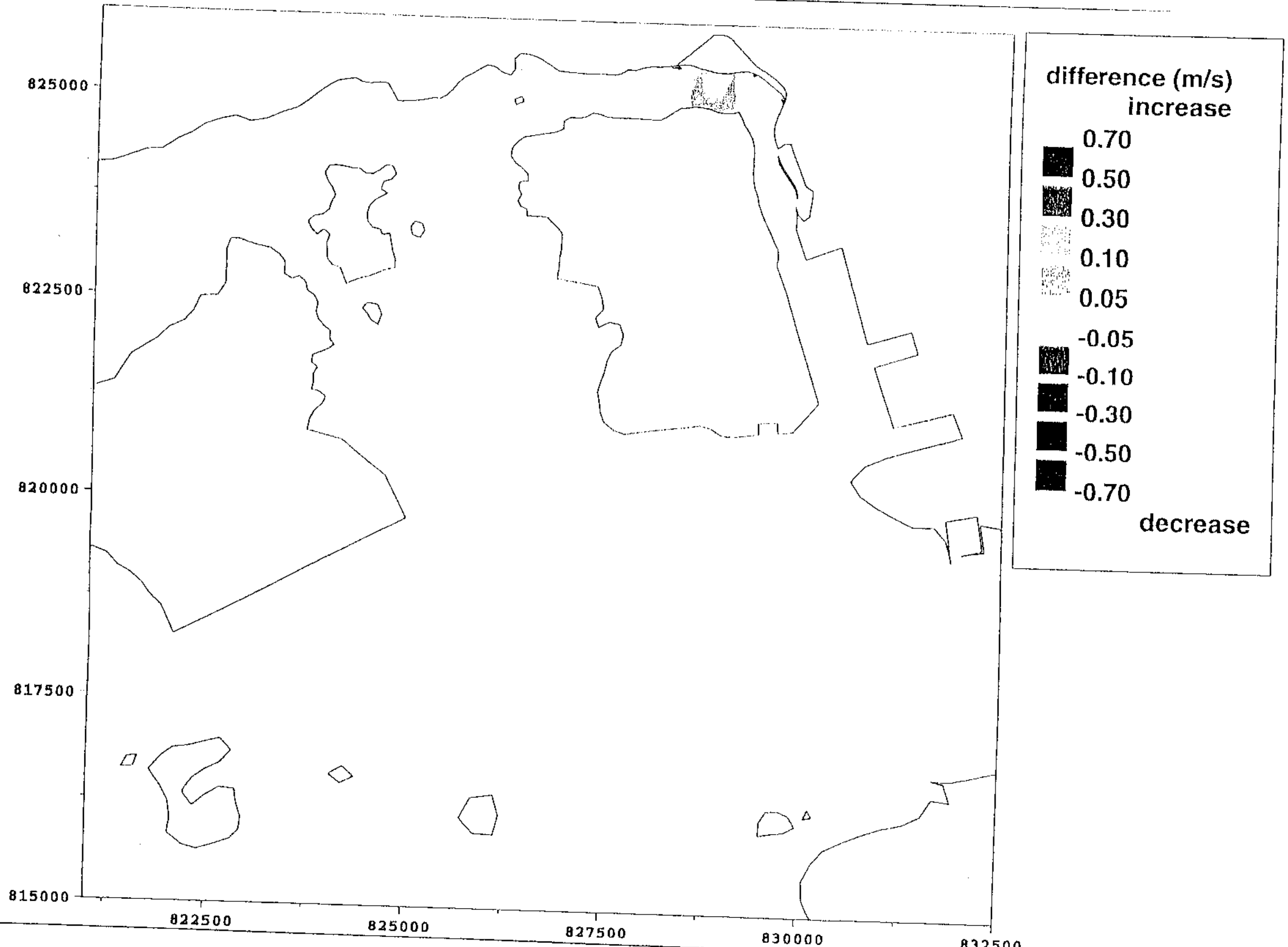

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
COMPLETED, PEAK EBB VECTORS, DRY SEASON NEAP TIDE, SURFACE (TSUEN WAN BAY)

FIGURE 80



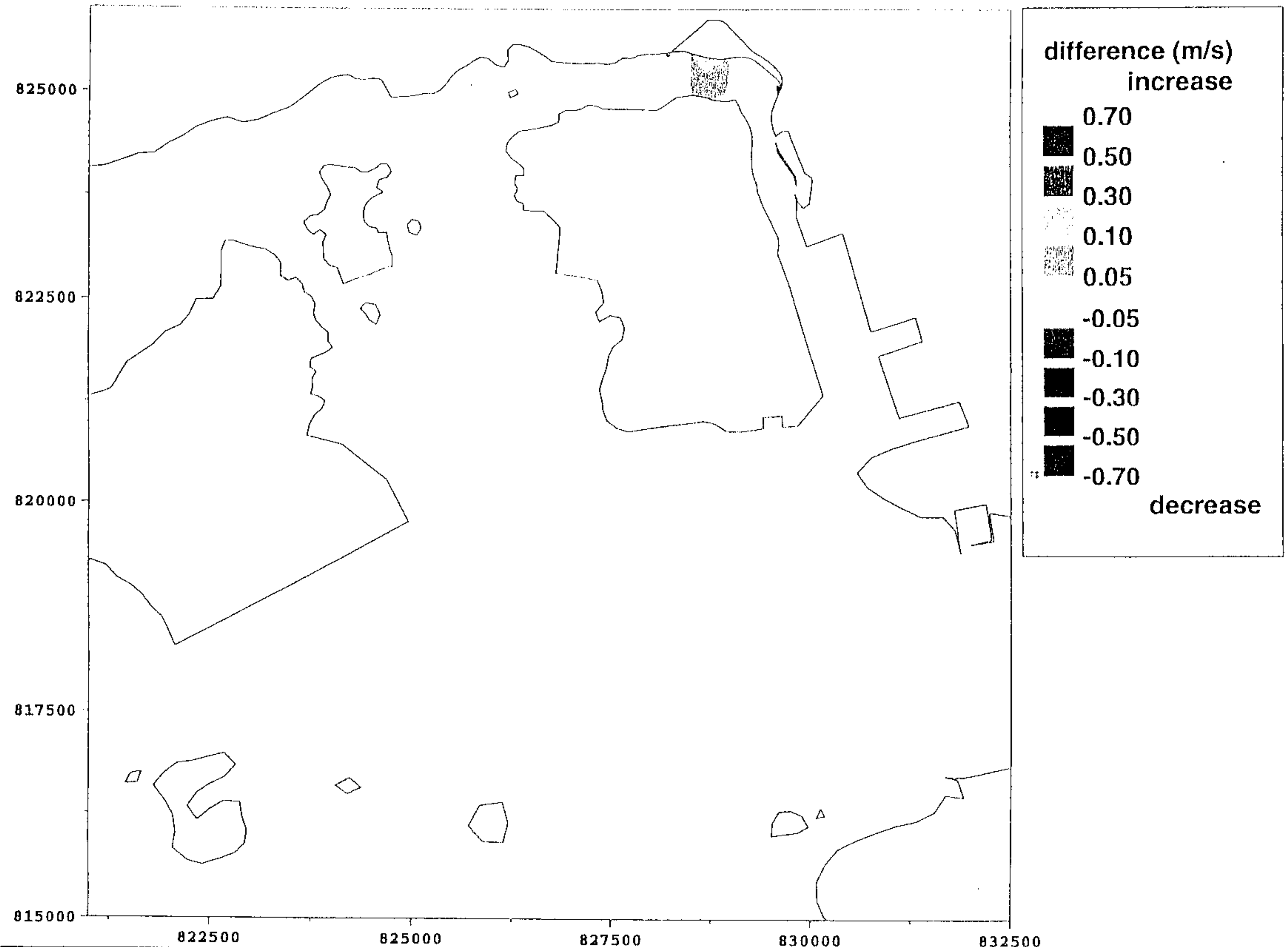

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
COMPLETED, PEAK EBB VECTORS, DRY SEASON NEAP TIDE, MID-DEPTH (TSUEN WAN BAY)

FIGURE 81




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
DIFFERENCE IN DEPTH-MEAN CURRENT SPEED, PEAK FLOOD, DRY SEASON NEAP TIDE

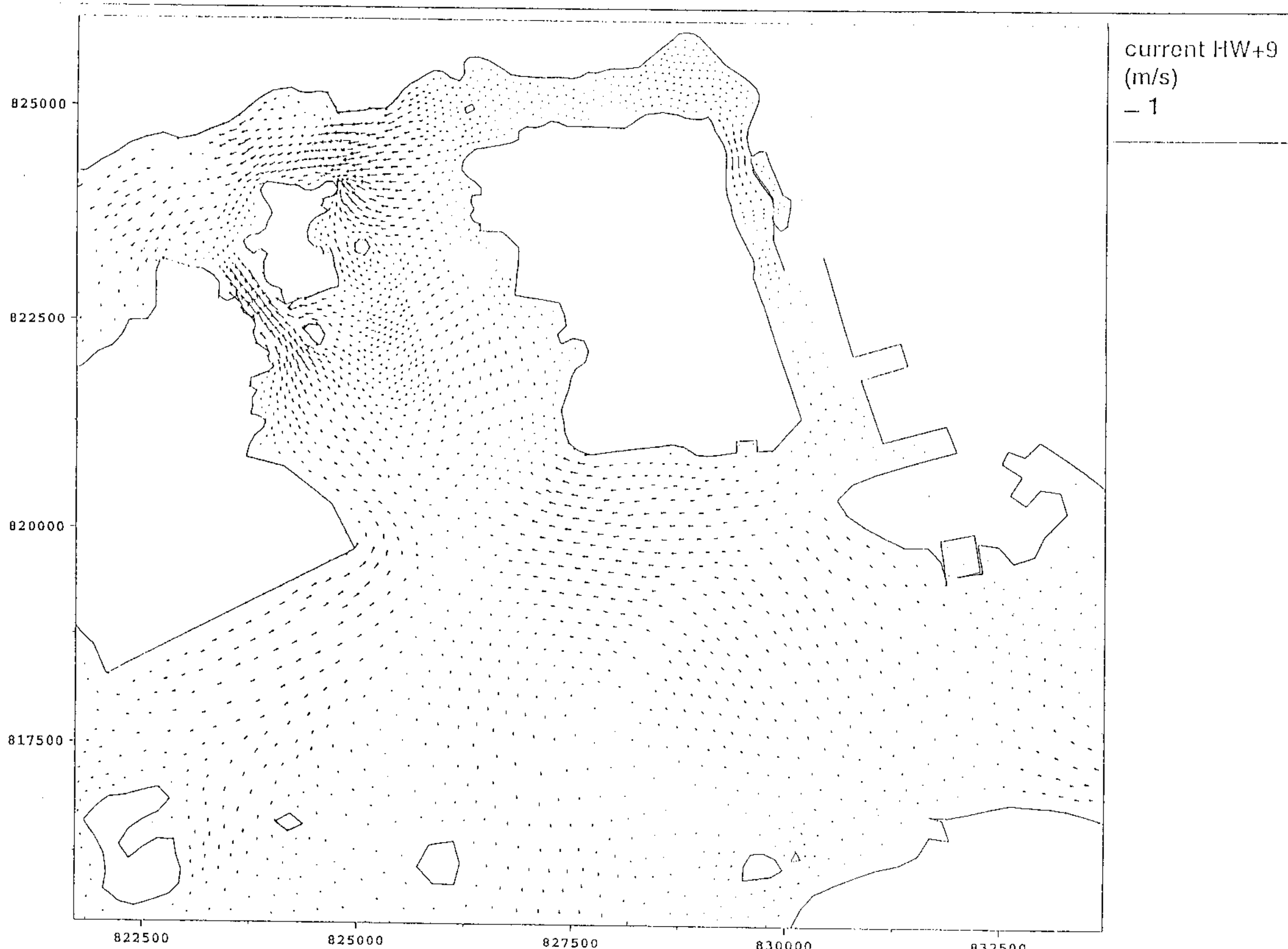
FIGURE 82




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

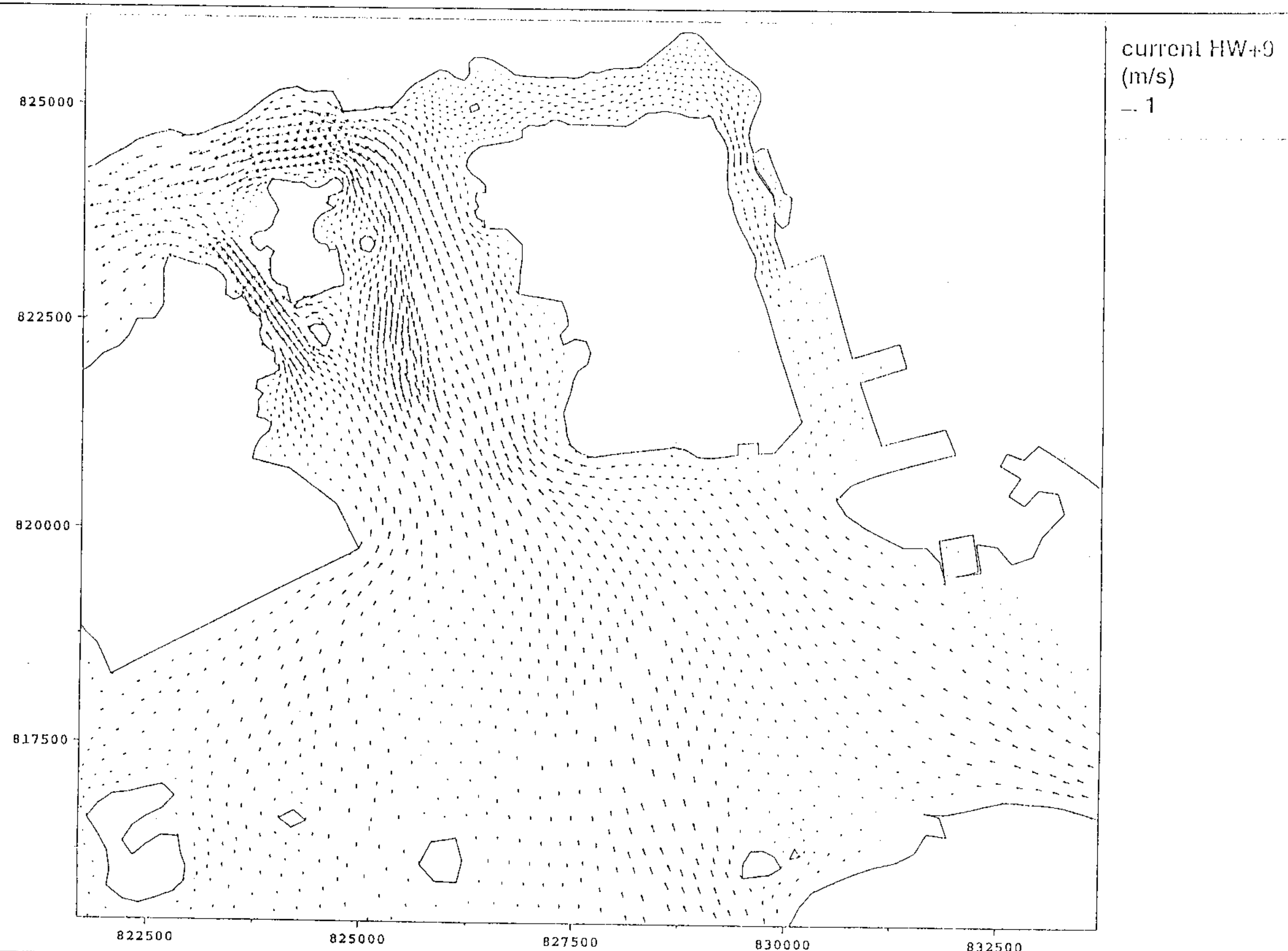
DIFFERENCE IN DEPTH-MEAN CURRENT SPEED, PEAK EBB, DRY SEASON NEAP TIDE

FIGURE 83




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK FLOOD VECTORS, WET SEASON NEAP TIDE, SURFACE (LARGE VIEW)

FIGURE 84



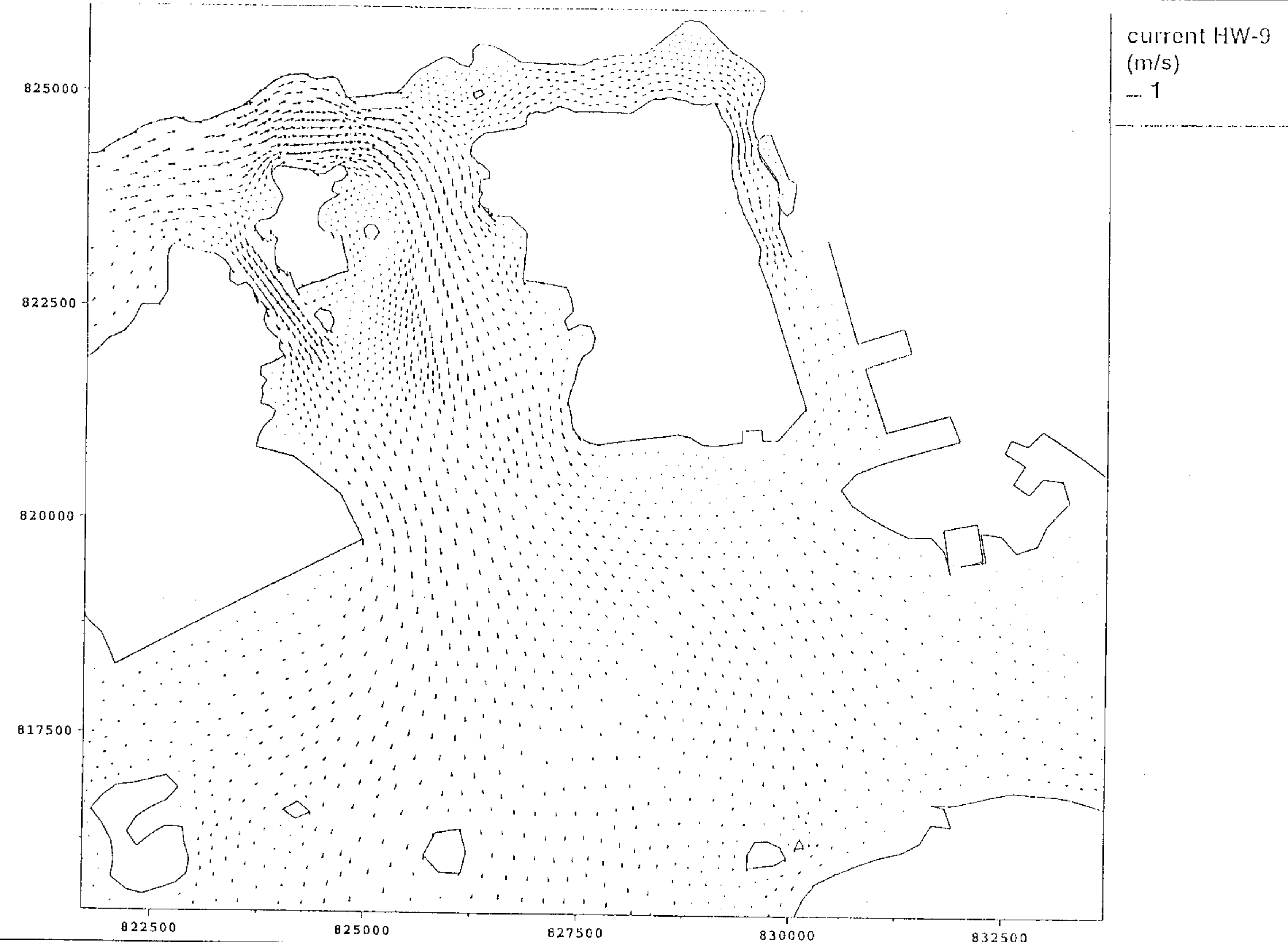

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK FLOOD VECTORS, WET SEASON NEAP TIDE, MID-DEPTH (LARGE VIEW)

FIGURE 85


TSUEN WAN BAY FURTHER RECLAMATION, AREA 35

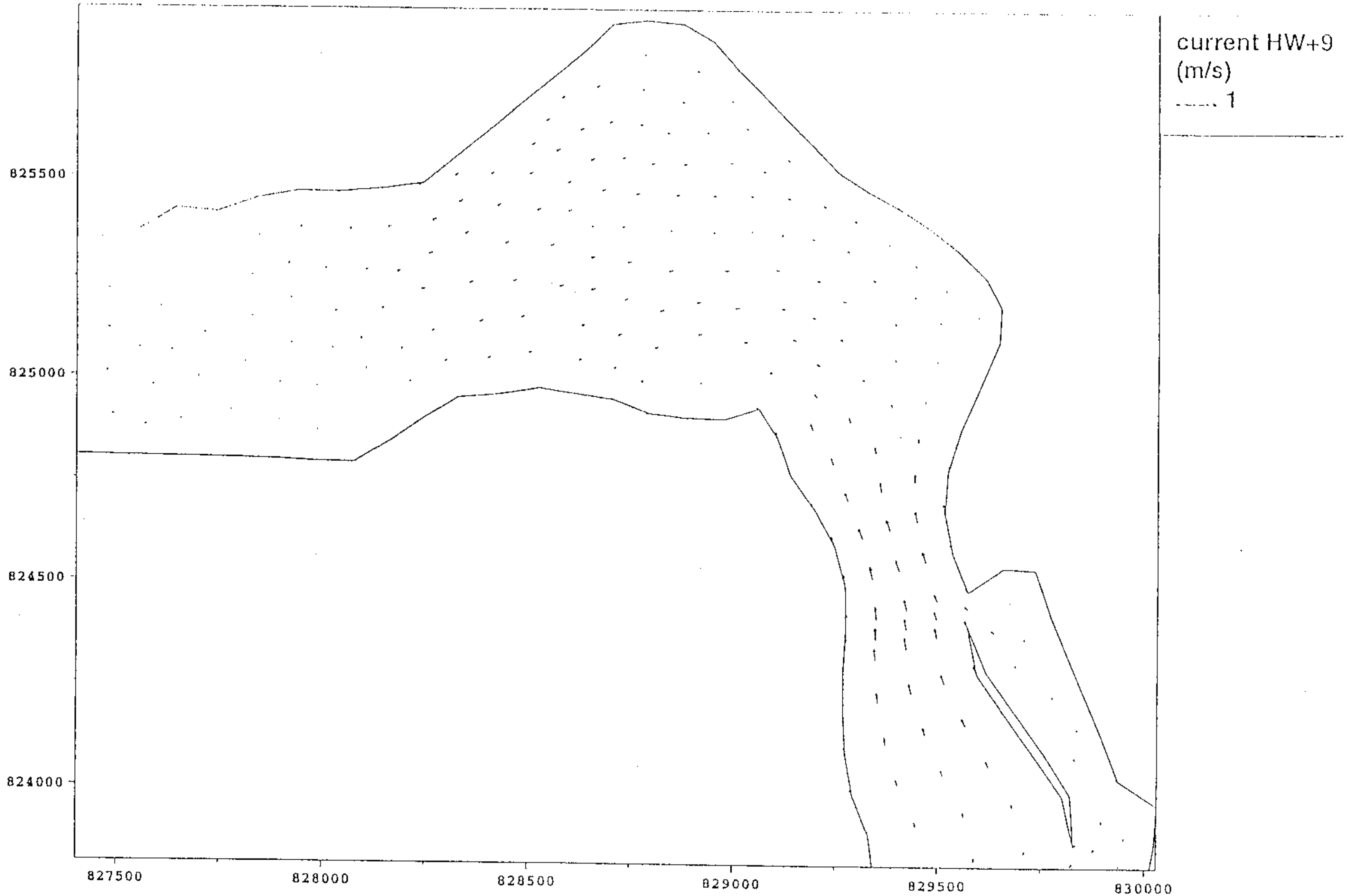
BASELINE, PEAK EBB VECTORS, WET SEASON NEAP TIDE, SURFACE (LARGE VIEW)

FIGURE 86



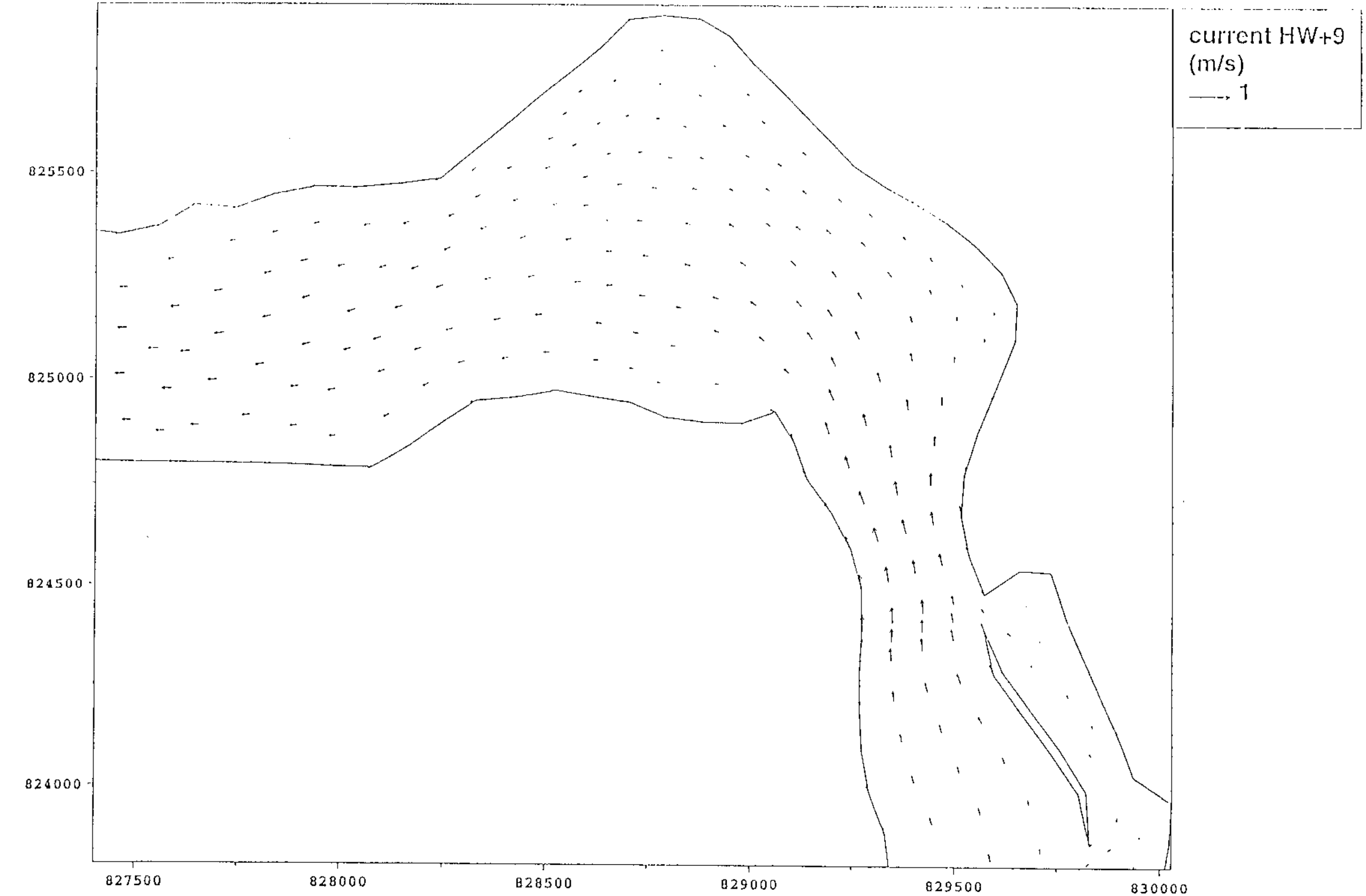

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK EBB VECTORS, WET SEASON NEAP TIDE, MID-DEPTH (LARGE VIEW)

FIGURE 87



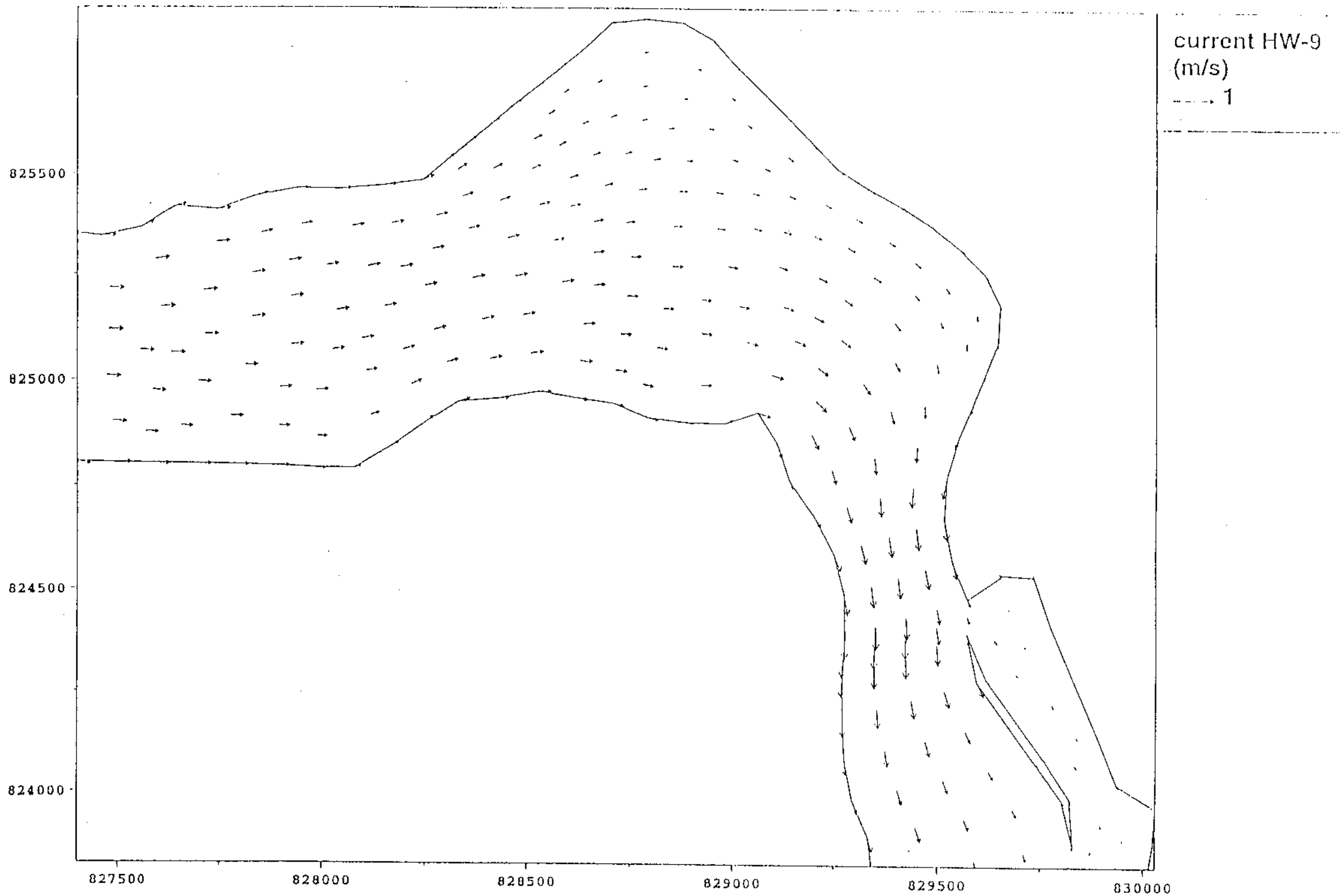

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK FLOOD VECTORS, WET SEASON NEAP TIDE, SURFACE (TSUEN WAN BAY)

FIGURE 88



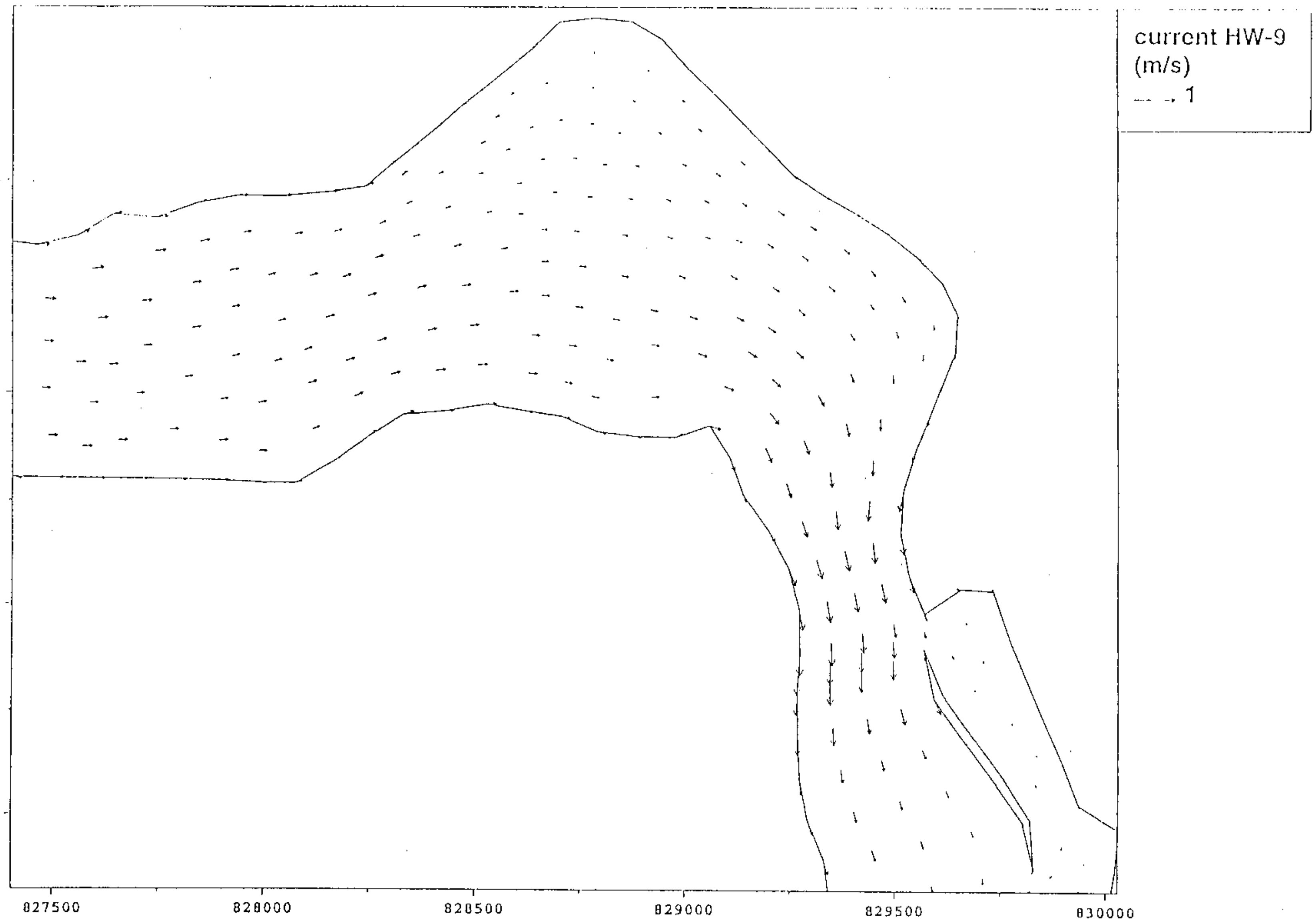

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK FLOOD VECTORS, WET SEASON NEAP TIDE, MID-DEPTH (TSUEN WAN BAY)

FIGURE 89



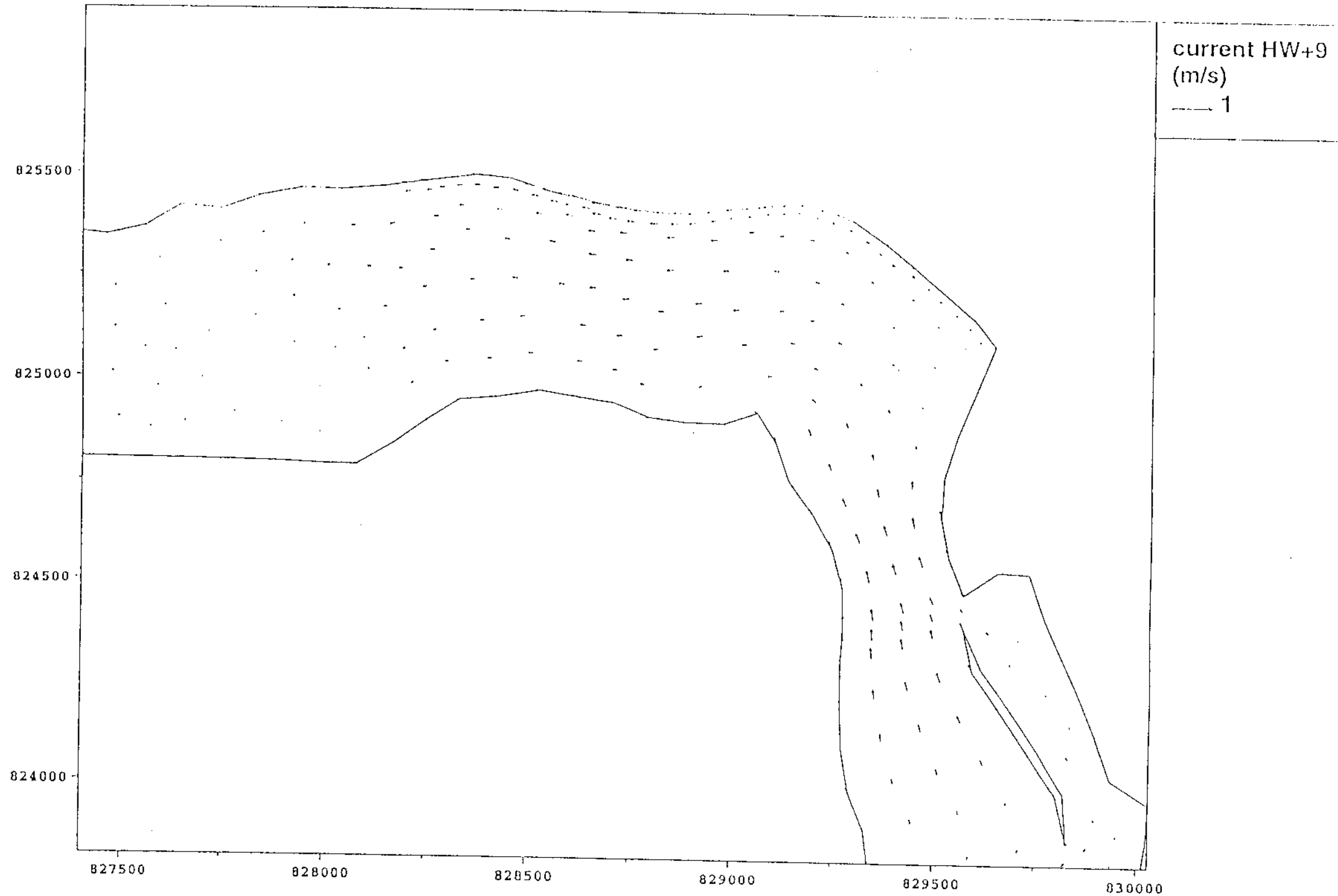

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK EBB VECTORS, WET SEASON NEAP TIDE, SURFACE (TSUEN WAN BAY)

FIGURE 90



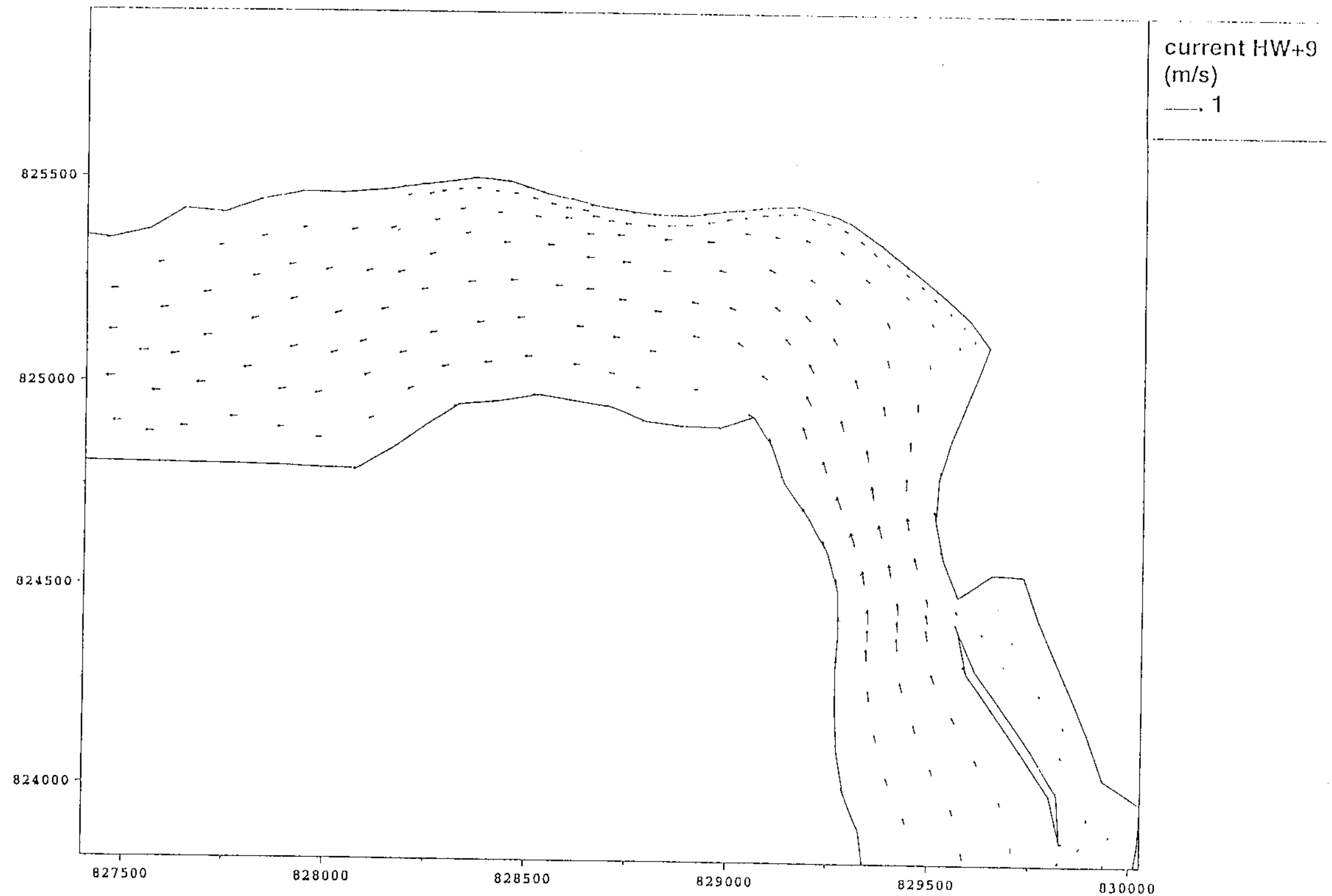

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
BASELINE, PEAK EBB VECTORS, WET SEASON NEAP TIDE, MID-DEPTH (TSUEN WAN BAY)

FIGURE 91



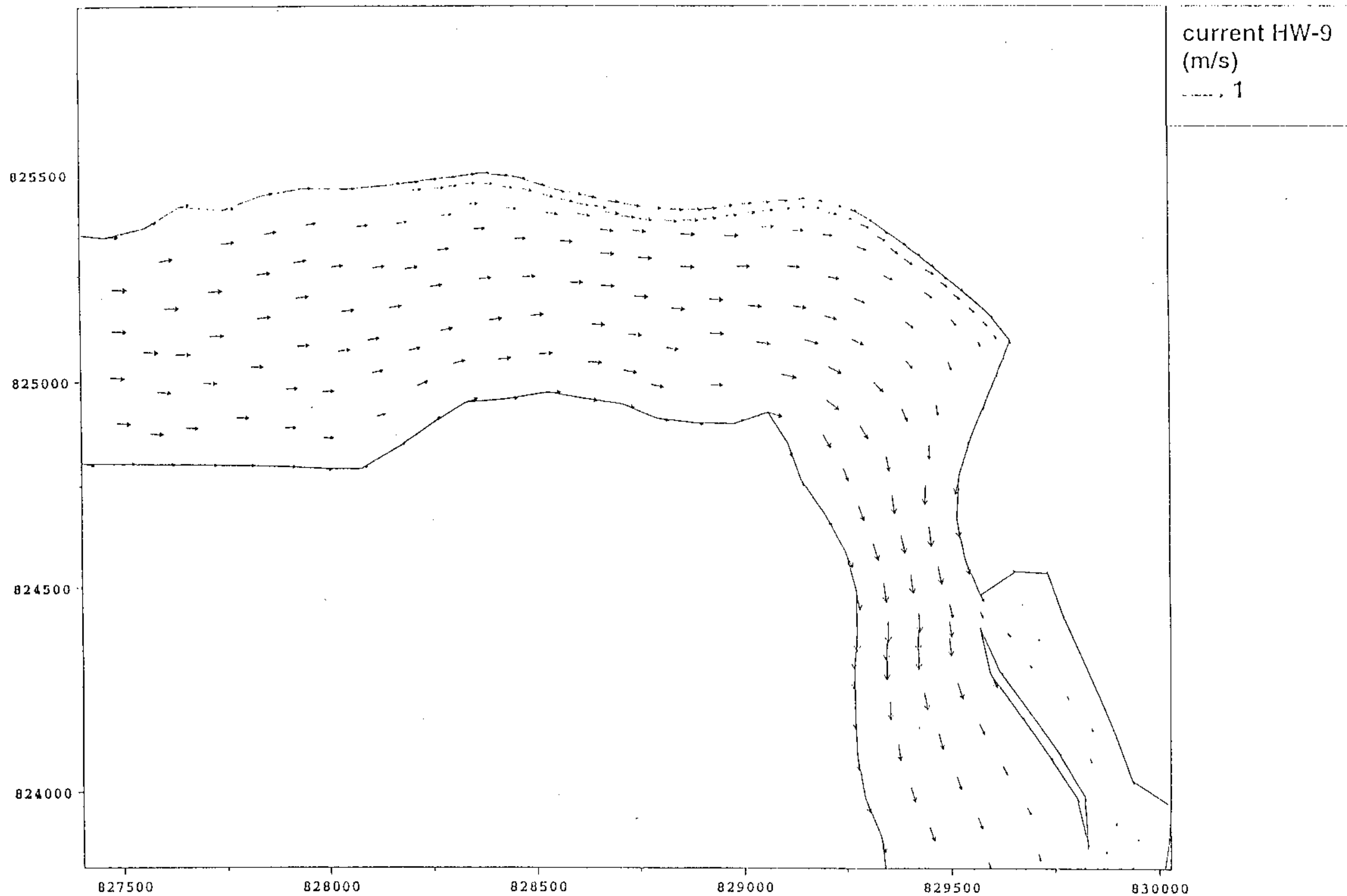

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
COMPLETED, PEAK FLOOD VECTORS, WET SEASON NEAP TIDE, SURFACE (TSUEN WAN BAY)

FIGURE 92



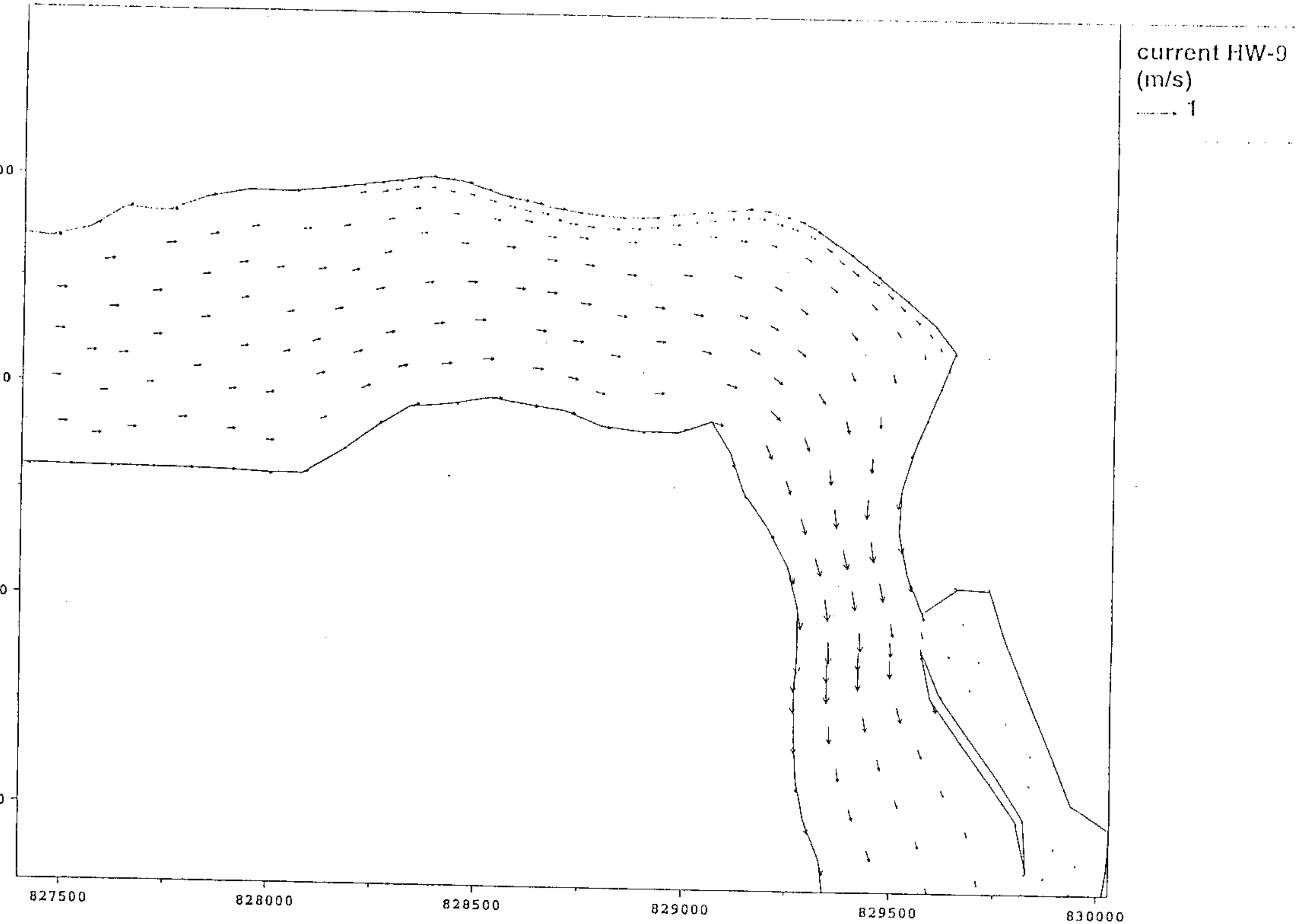

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
COMPLETED, PEAK FLOOD VECTORS, WET SEASON NEAP TIDE, MID-DEPTH (TSUEN WAN BAY)

FIGURE 93



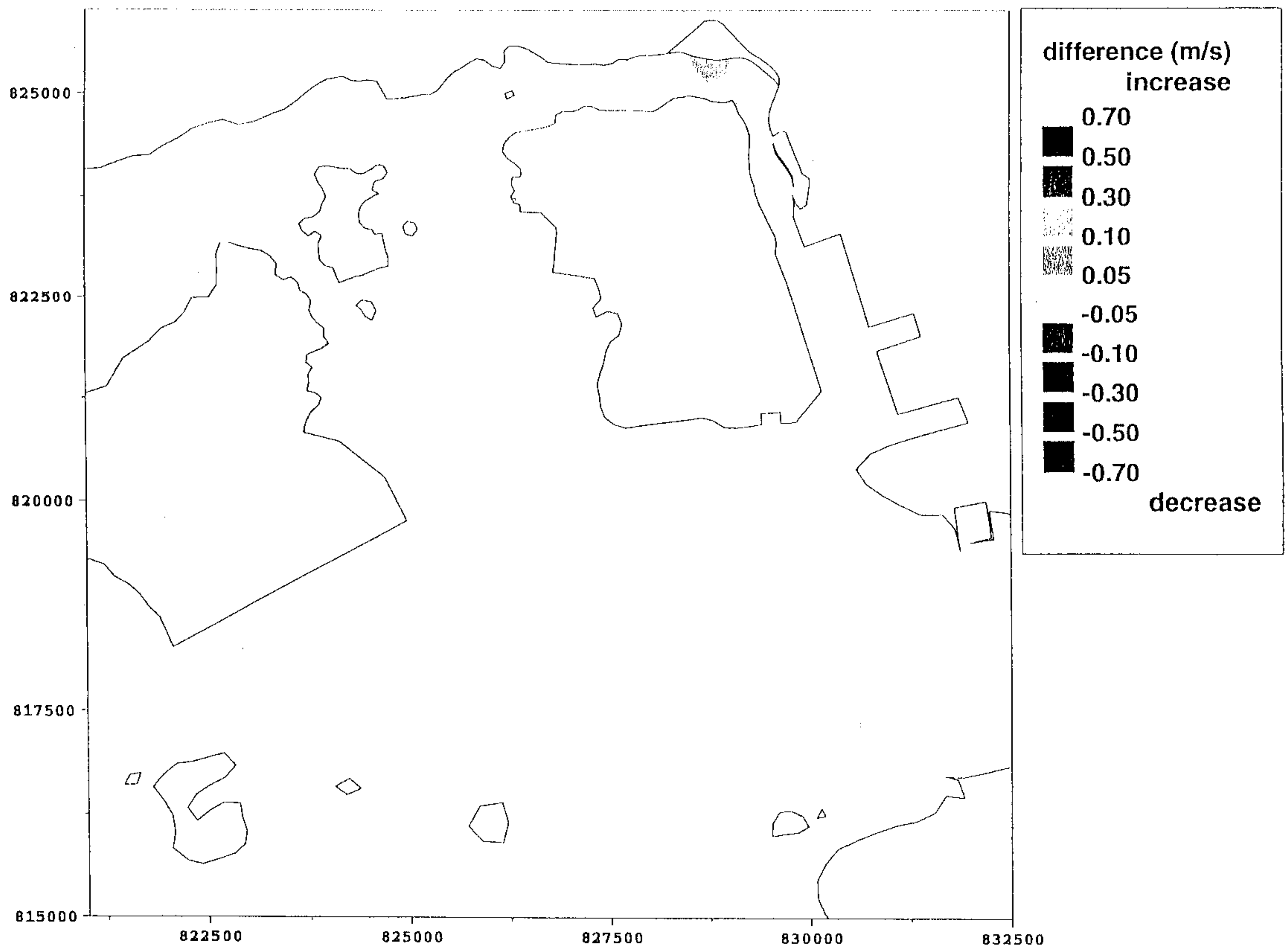

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
COMPLETED, PEAK EBB VECTORS, WET SEASON NEAP TIDE, SURFACE (TSUEN WAN BAY)

FIGURE 94



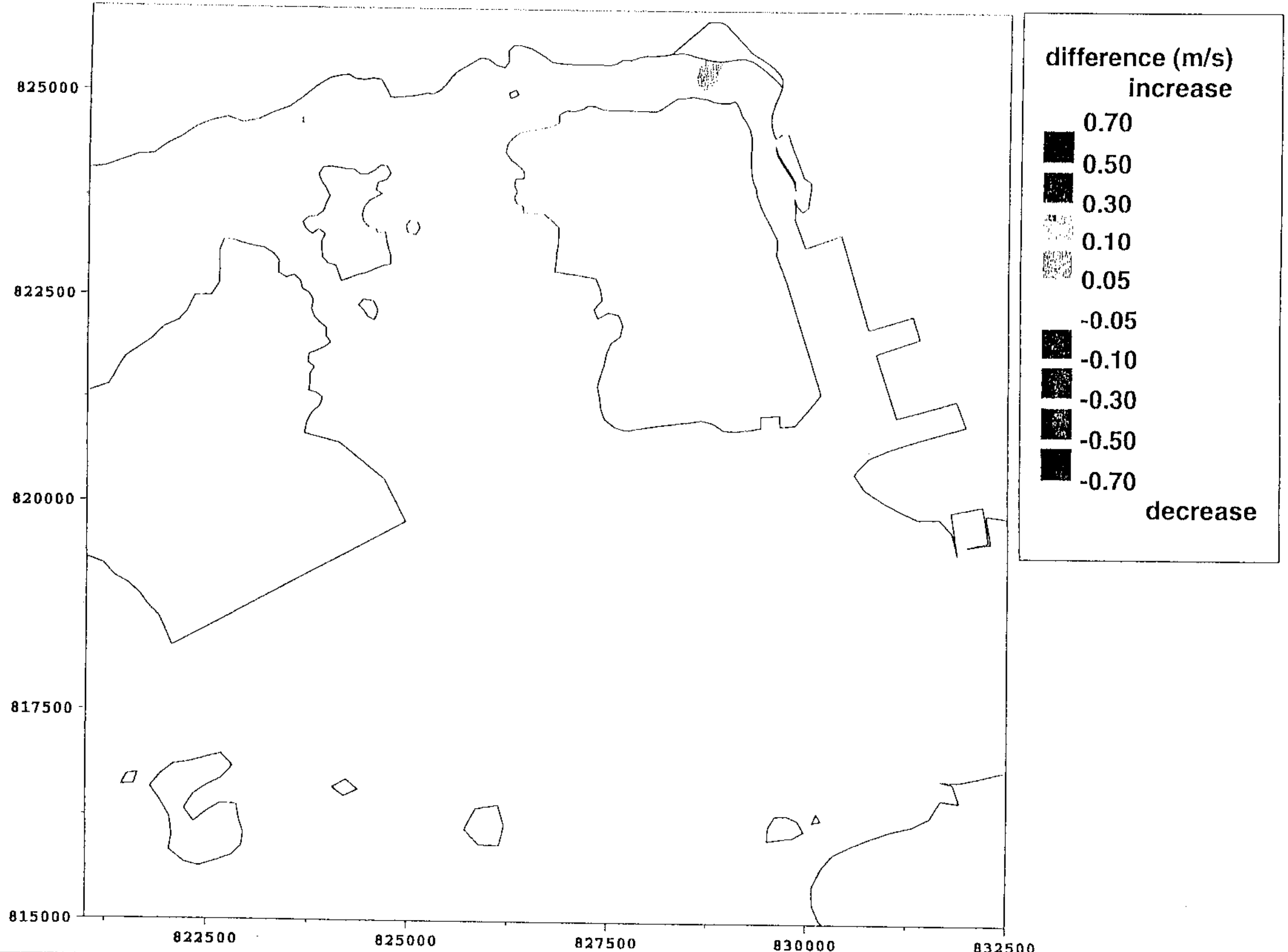

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
COMPLETED, PEAK EBB VECTORS, WET SEASON NEAP TIDE, MID-DEPTH (TSUEN WAN BAY)

FIGURE 95



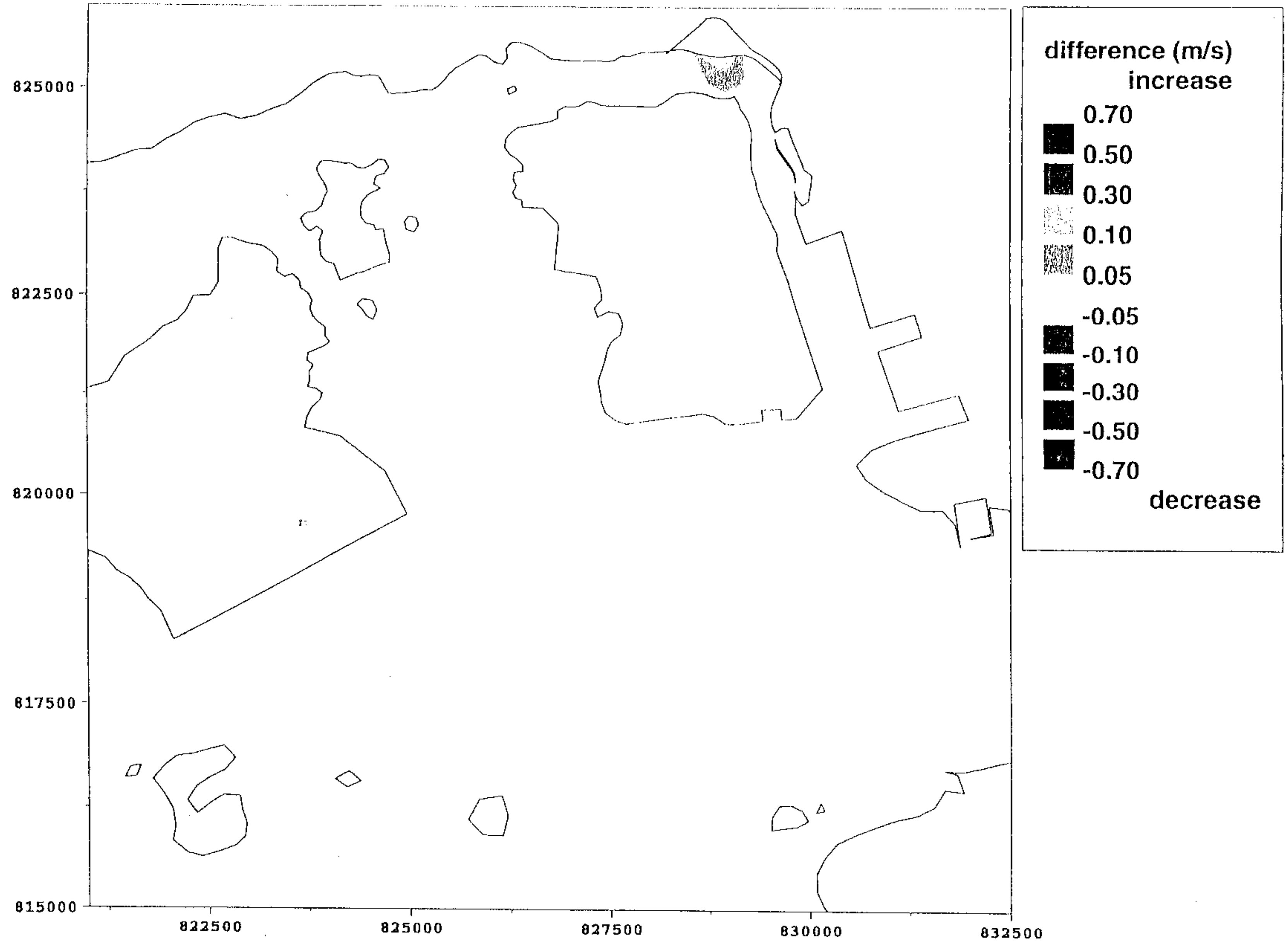

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
DIFFERENCE IN SURFACE CURRENT SPEED, PEAK FLOOD, WET SEASON NEAP TIDE

FIGURE 96



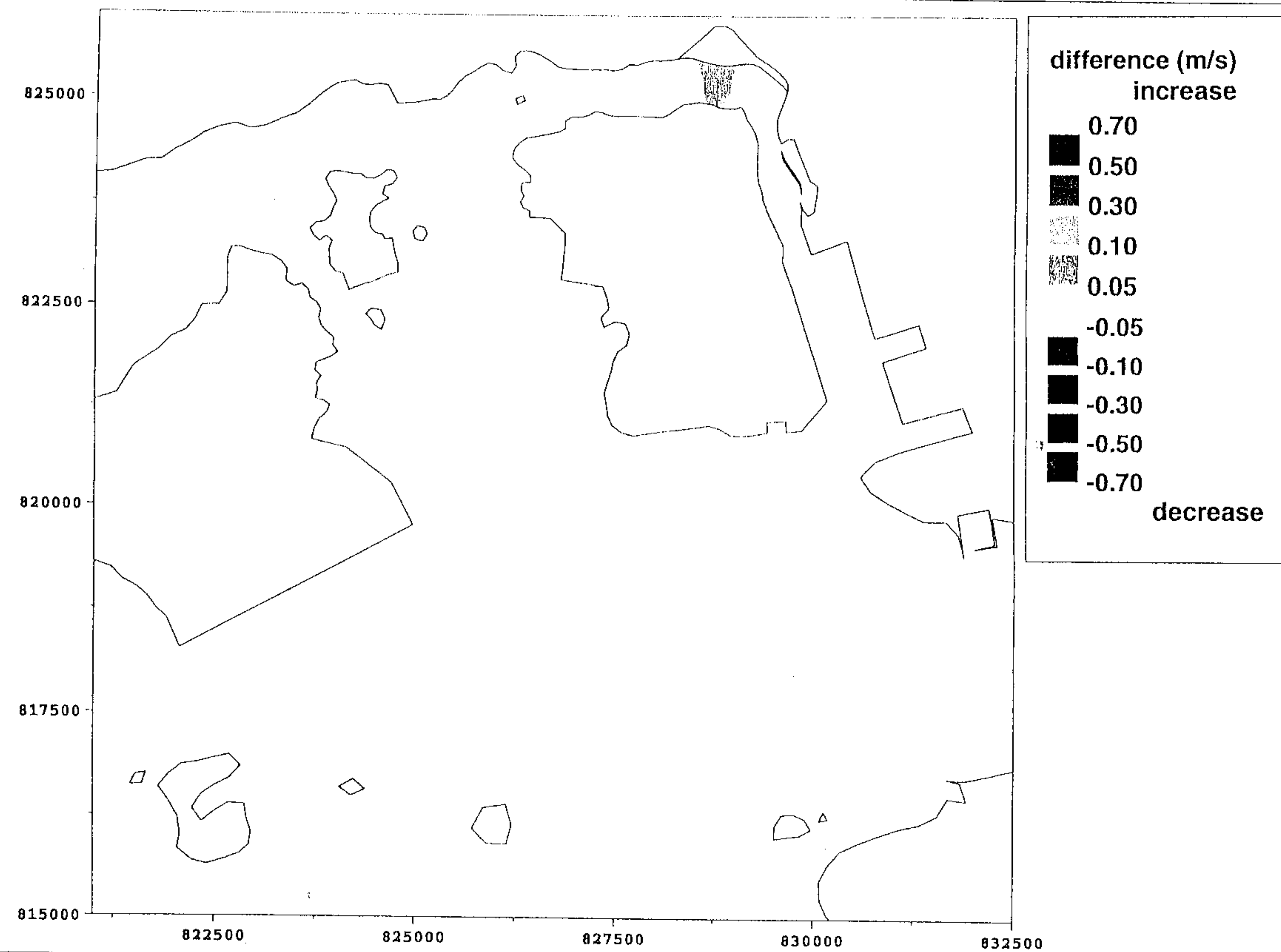

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
DIFFERENCE IN MID-DEPTH CURRENT SPEED, PEAK FLOOD, WET SEASON NEAP TIDE

FIGURE 97



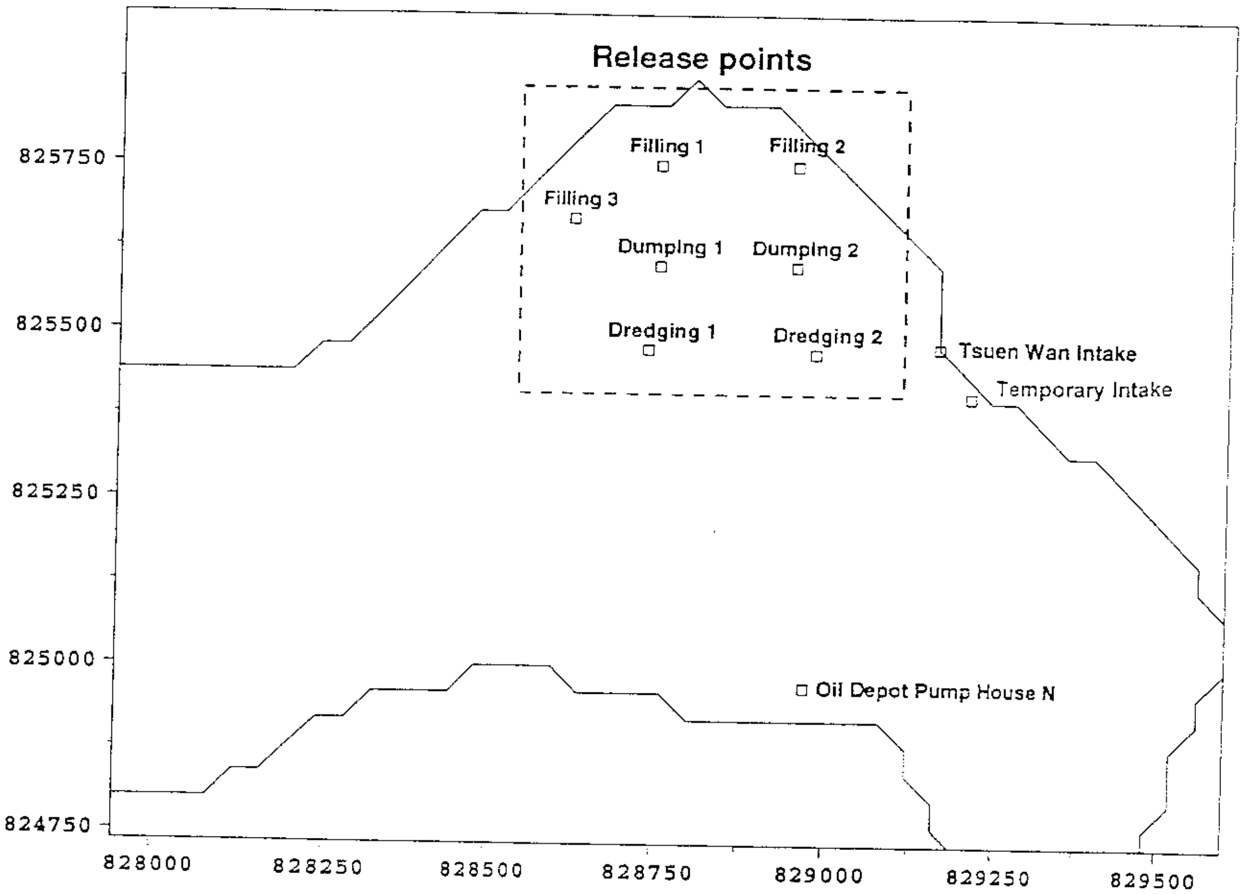

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
DIFFERENCE IN SURFACE CURRENT SPEED, PEAK EBB, WET SEASON NEAP TIDE

FIGURE 98

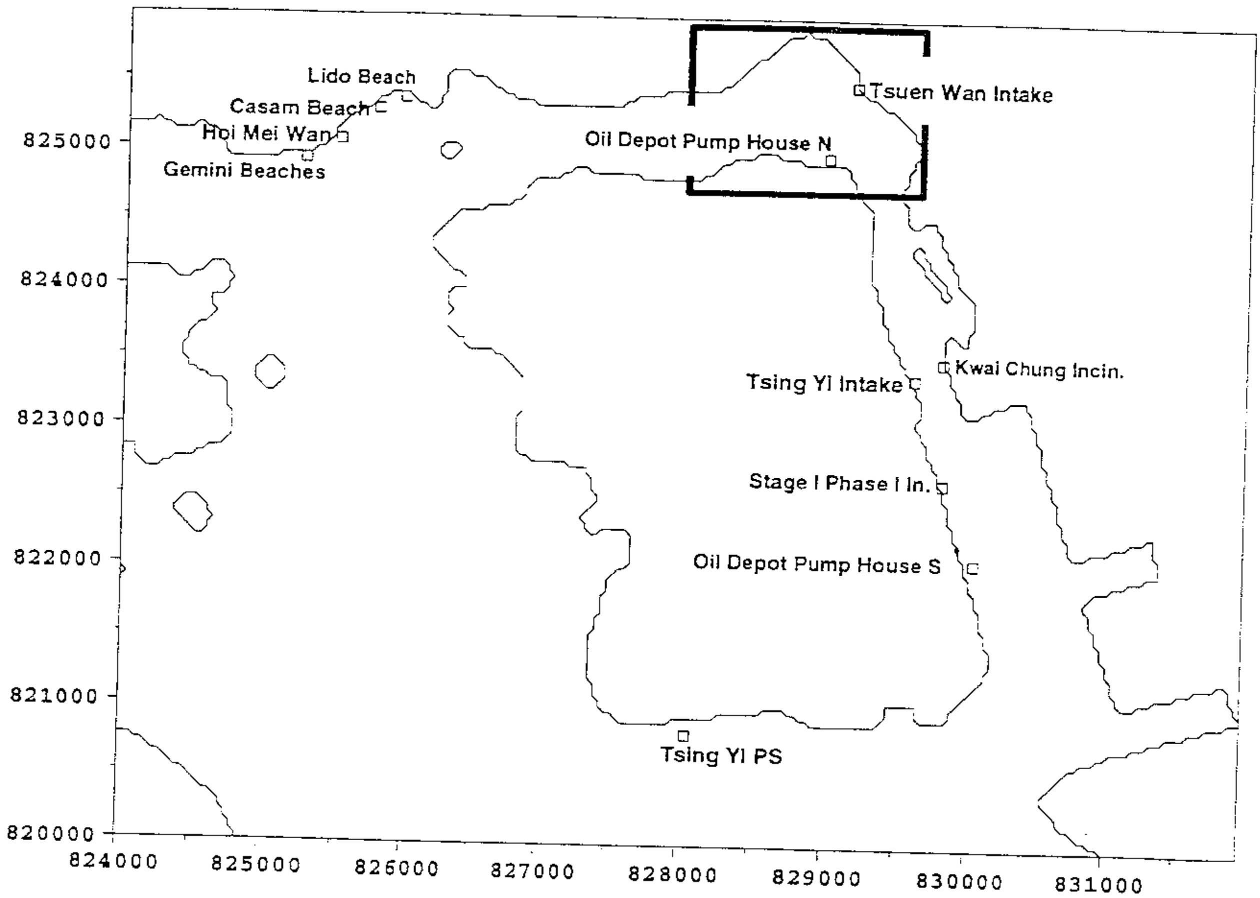



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
DIFFERENCE IN MID-DEPTH CURRENT SPEED, PEAK EBB, WET SEASON NEAP TIDE

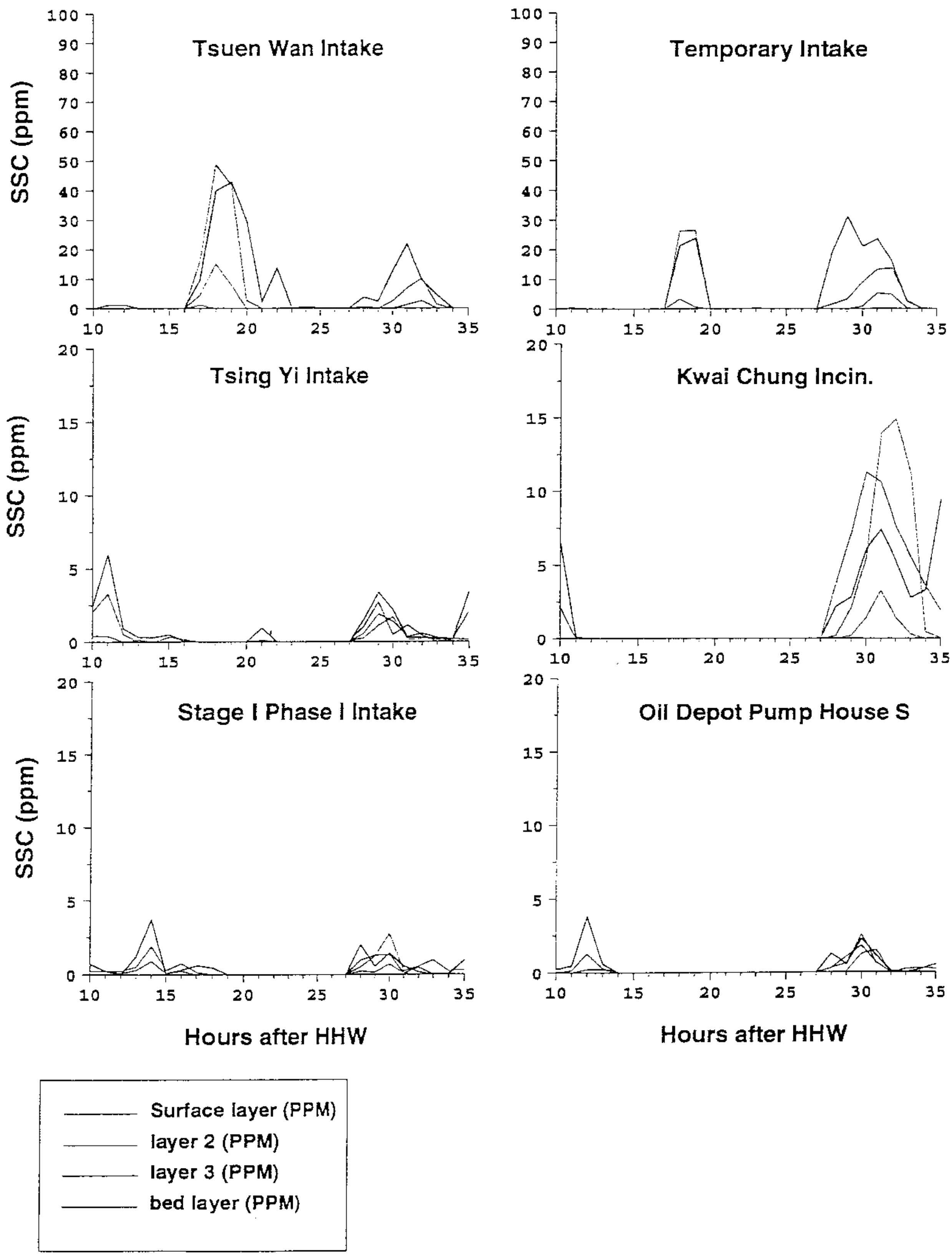
FIGURE 99



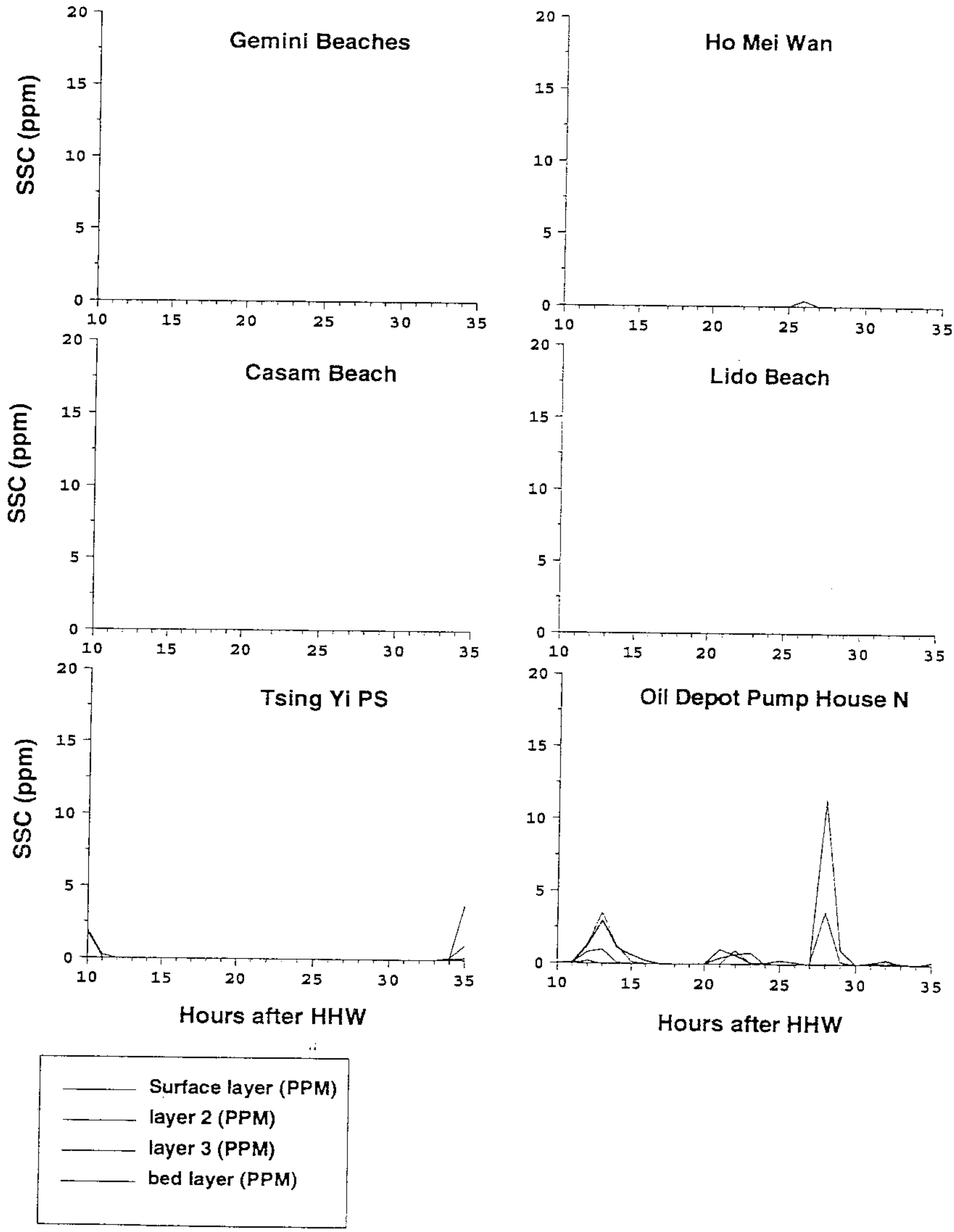

| | |
|---|---|
| TSUEN WAN BAY FURTHER RECLAMATION, AREA 35<br>LOCATIONS OF SEDIMENT RELEASE POINTS<br>& SENSITIVE RECEIVERS | FIGURE 100 |



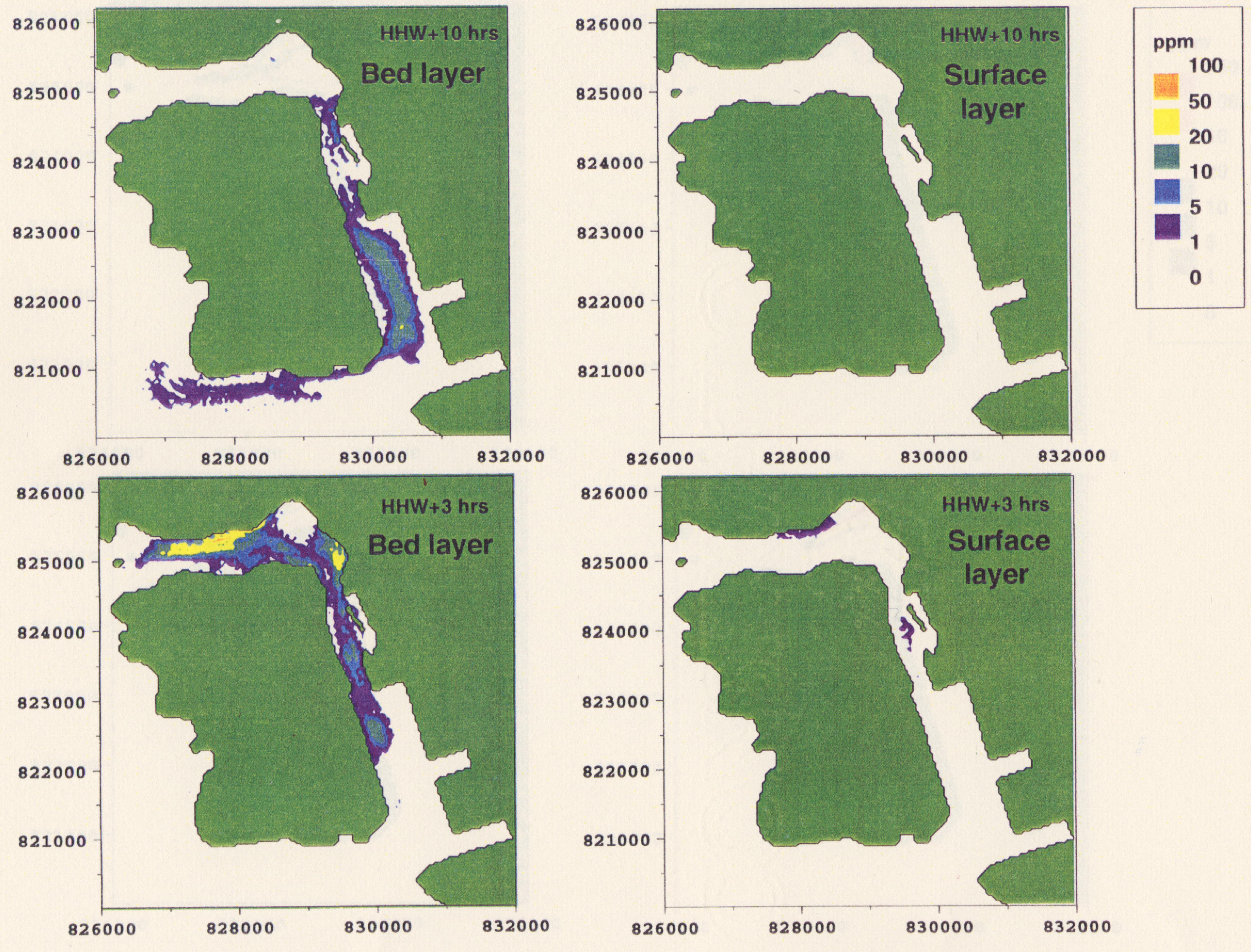

| | |
|---|---|
| TSUEN WAN BAY FURTHER RECLAMATION, AREA 35<br>LOCATIONS OF SENSITIVE RECEIVERS | FIGURE 101 |




| TSUEN WAN BAY FURTHER RECLAMATION, AREA 35<br>SUSPENDED SEDIMENT CONCENTRATIONS AT SENSITIVE RECEIVERS, DRY SEASON SPRING TIDE | FIGURE 102 |
|---|---|

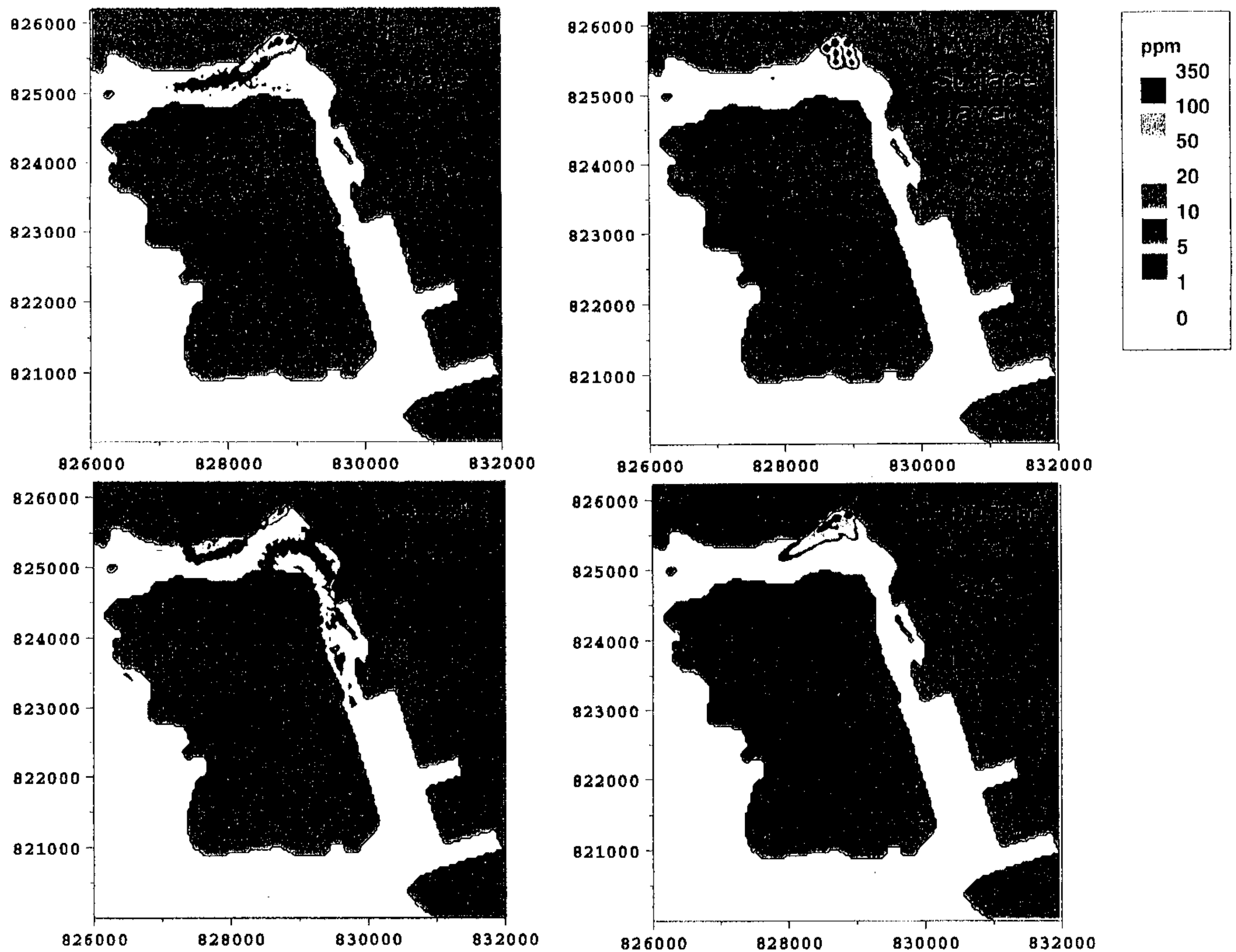



| TSUEN WAN BAY FURTHER RECLAMATION, AREA 35<br>SUSPENDED SEDIMENT CONCENTRATIONS AT SENSITIVE RECEIVERS, DRY SEASON SPRING TIDE | FIGURE 103 |
|---|---|



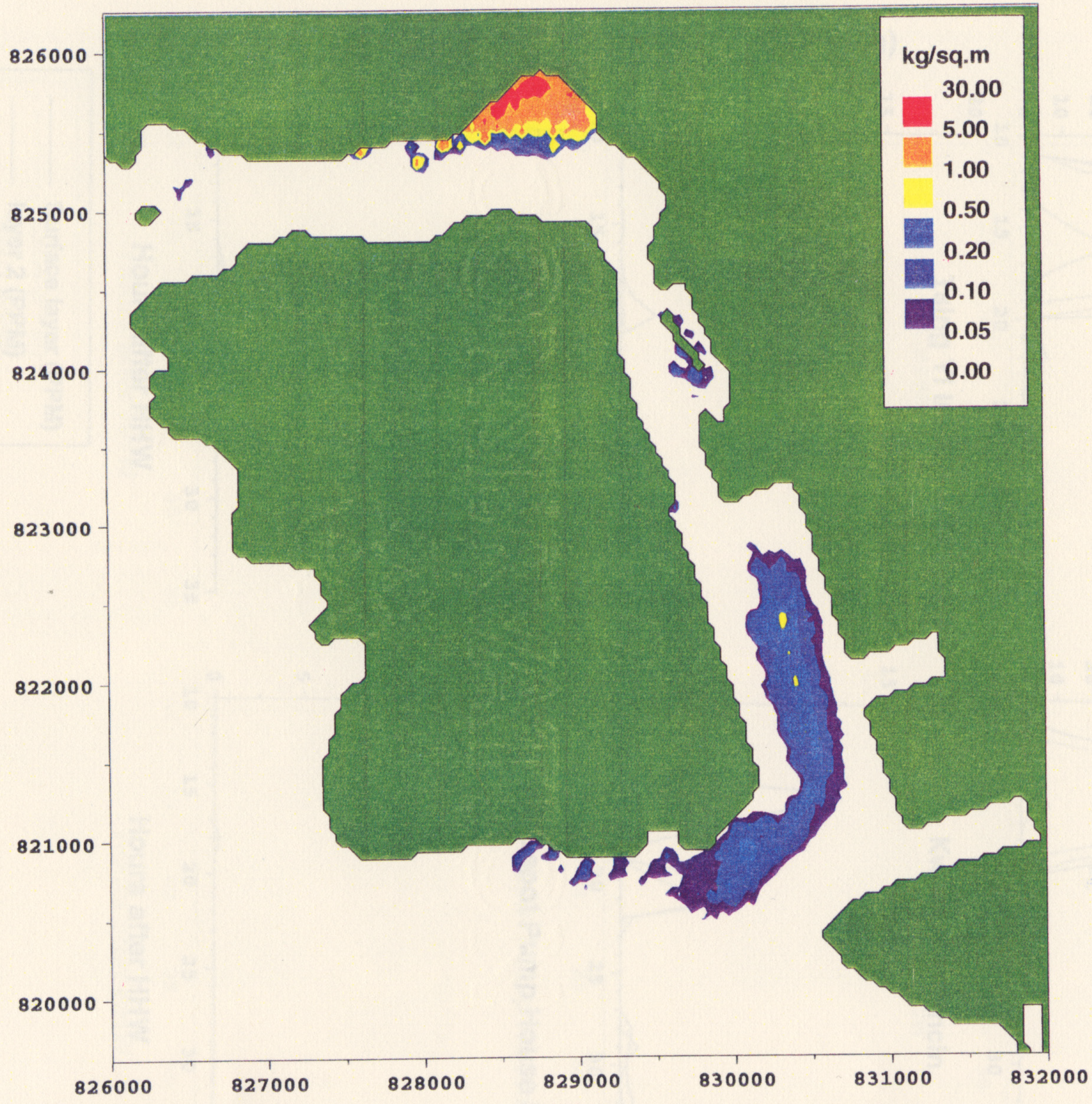

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
CONTOURS OF SUSPENDED SEDIMENT CONCENTRATIONS
DRY SEASON SPRING TIDE

FIGURE 104



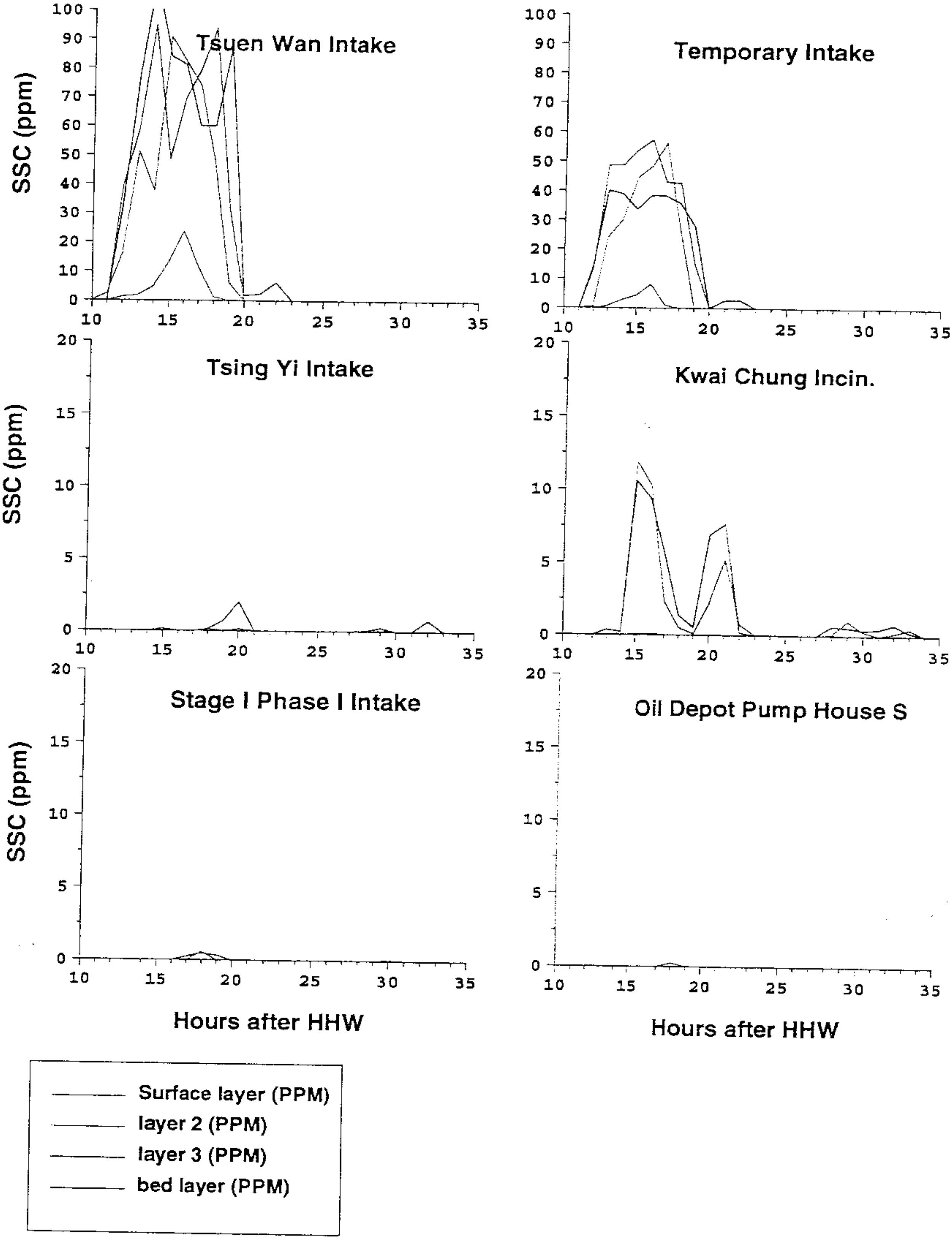

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
CONTOURS OF SUSPENDED SEDIMENT CONCENTRATIONS
DRY SEASON SPRING TIDE

FIGURE 105



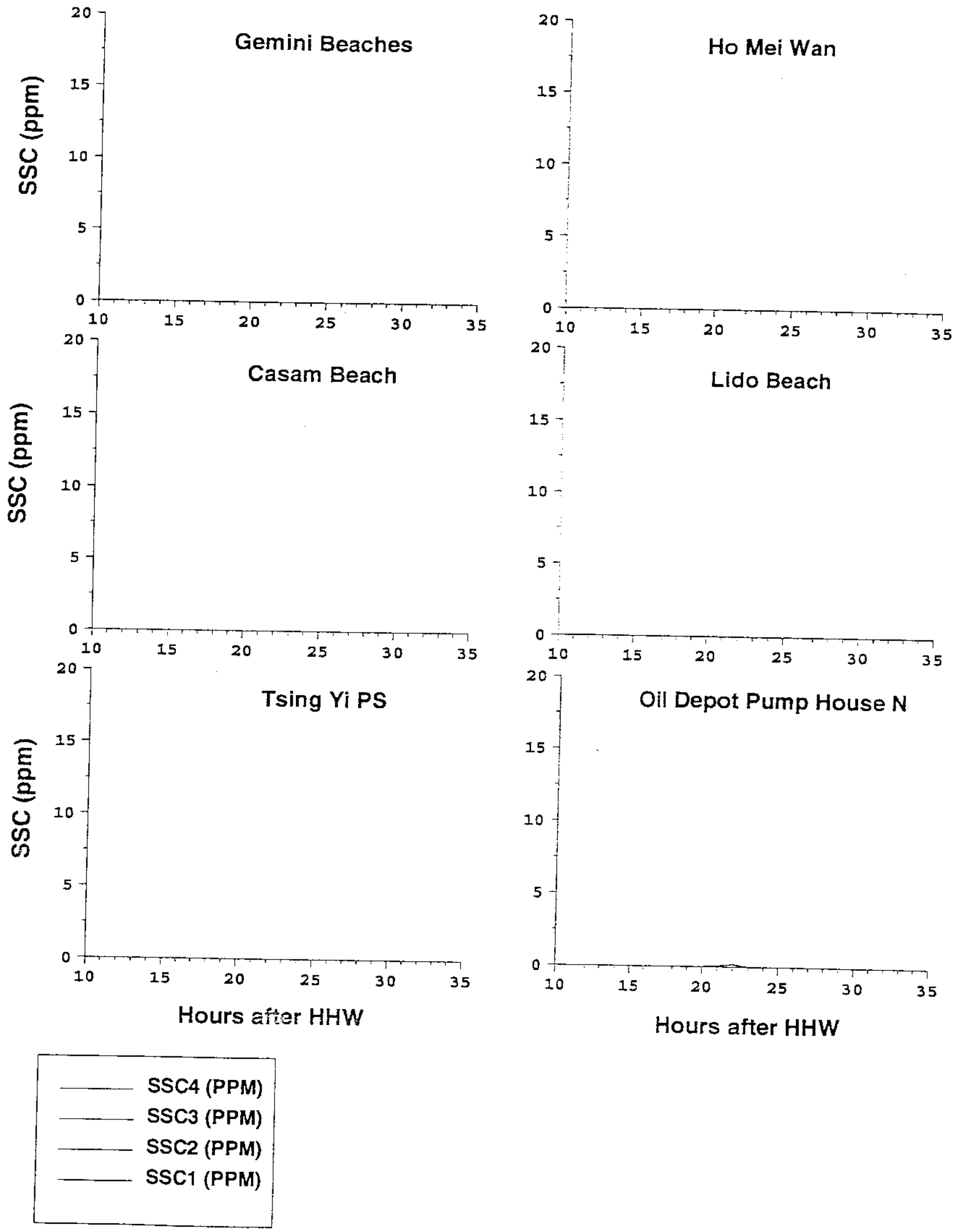

TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
CONTOURS OF NET DEPOSITION
DRY SEASON SPRING TIDE

FIGURE 106

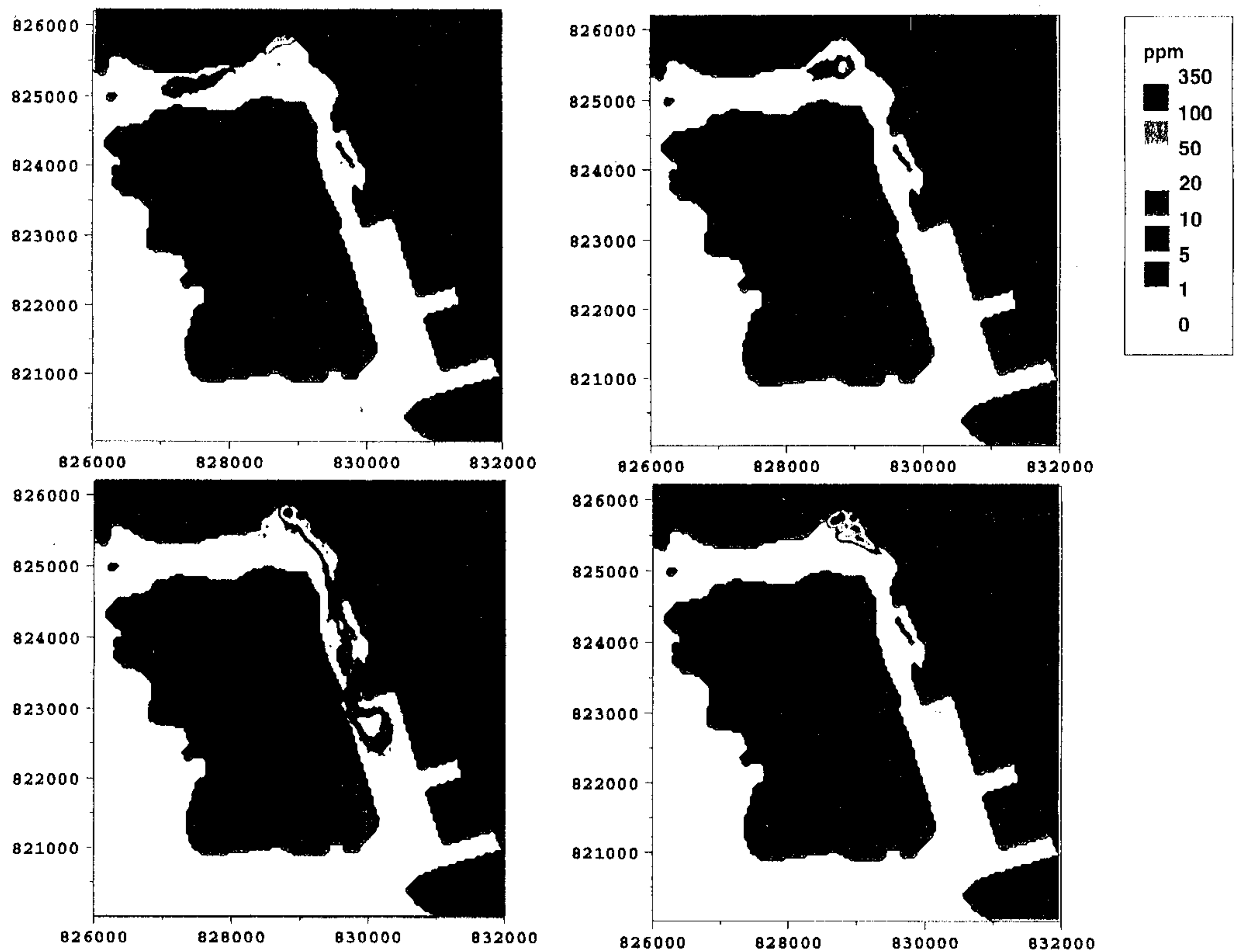



TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
SUSPENDED SEDIMENT CONCENTRATIONS AT SENSITIVE RECEIVERS, WET SEASON NEAP TIDE

FIGURE 107

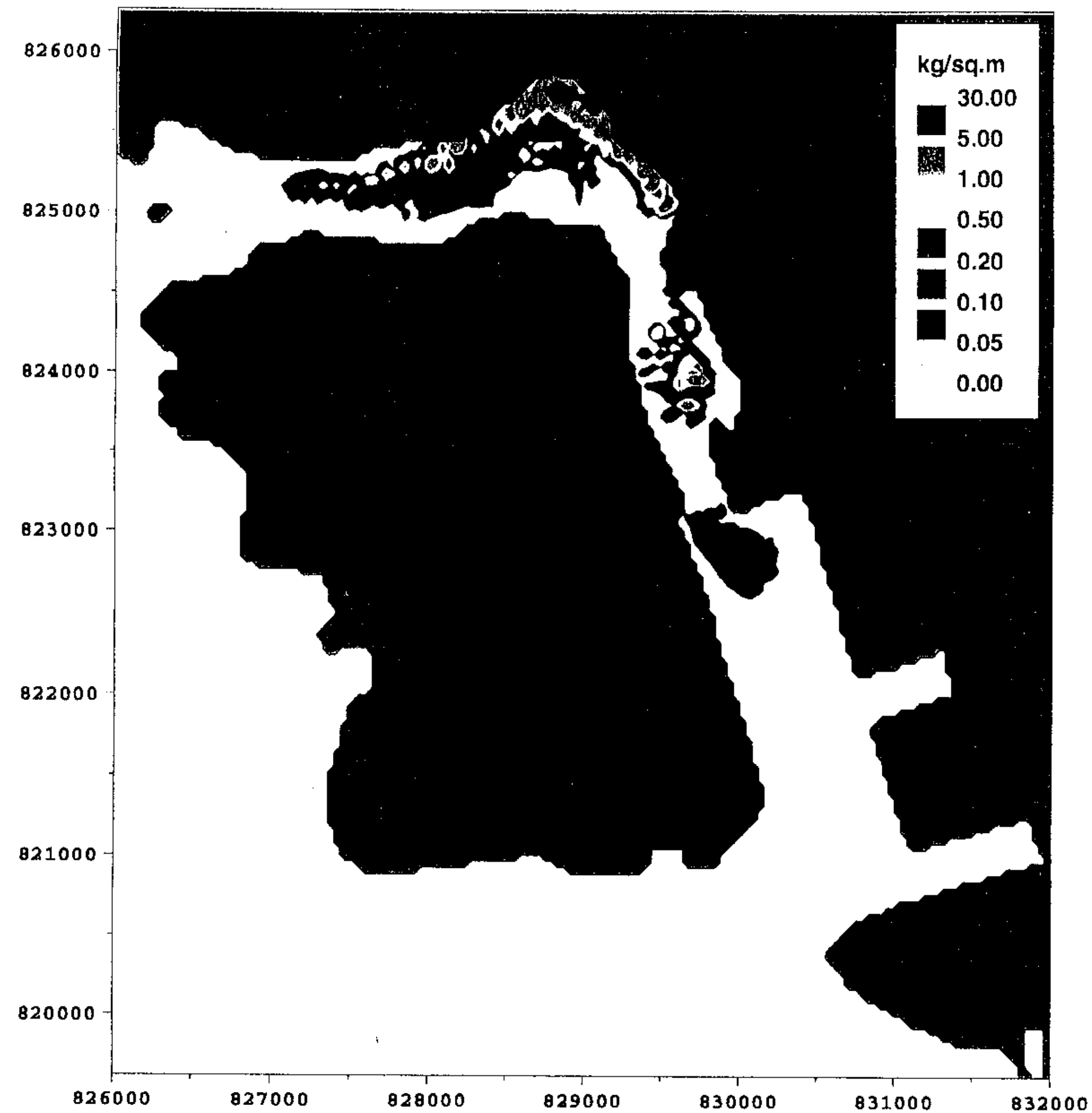



| | |
|---|---|
| TSUEN WAN BAY FURTHER RECLAMATION, AREA 35<br>SUSPENDED SEDIMENT CONCENTRATIONS AT SENSITIVE RECEIVERS, WET SEASON NEAP TIDE | FIGURE 108 |




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
CONTOURS OF SUSPENDED SEDIMENT CONCENTRATIONS
WET SEASON NEAP TIDE

FIGURE 109




TSUEN WAN BAY FURTHER RECLAMATION, AREA 35
CONTOURS OF NET DEPOSITION
WET SEASON NEAP TIDE

FIGURE 110

# APPENDIX A
# DERIVATION OF SEDIMENT PLUME MODEL INPUT PARAMETERS

## Notes on Loss Rate for Filling by Bottom Dumping, Dredging by Grab Dredger and Dumping Mud into Tsuen Wan Bay

The worst case cumulative activities for the construction of the Tsuen Wan Bay Further Reclamation will occur during the first phase of the construction. During this phase four concurrent activities will be taking place :

1. Dredging the seawall trench, 2 grab dredgers for a total of 7,500 $m^3$/day

2. Dumping of the dredged mud into Tsuen Wan Bay, 2 bottom dumping barges for a total of 7,500 $m^3$/day

3. Filling on top of the dumped mud by bottom dumping or pelican barge, 2 barges for a total of 9,000 $m^3$/day.

4. Filling for the sand blanket on top of the existing mud, 1 barge for a total of 4,500 $m^3$/day

This brief note gives a calculation for likely loss rates for the fines during dredging, dumping and filling.

### Loss Rate for Dredging

The rate of dredging will be 7,500$m^3$/day for a 12 hour working day which equates to a rate of dredging of 0.174 $m^3$/s. Assuming a dry density of 488kg/$m^3$ and a loss rate of 5% gives a loss to suspension of 4.24kg/s.

### Loss Rate for Dumping

The rate of dumping will be 7,500$m^3$/day for a 16 hour working day which equates to a rate of dredging of 0.174 $m^3$/s. Assuming a dry density of 488kg/$m^3$ and a loss rate of 5% gives a loss to suspension of 4.24kg/s.

### Loss Rate for Filling on Top of Dumped Mud

The fines content of the fill material will be specified to be not more than 20%. In order to maintain a conservative simulation it is proposed to assume a fines content of 20% for the sediment plume simulations.

A series of trial dumps were carried out at the East Tung Lung Chau MBA which is currently being assessed as to its suitability as a disposal area for uncontaminated marine mud. The material being dumped was marine mud which had a typical fines content of 60%-70%. The trial dumps showed that the loss rates were in the range of 0.9%-8.3% by weight of the total load dumped.

If we assume that a fines content of 60% leads to losses to suspension of 8.3% then a fines content of 20% will lead to a loss to suspension of 2.77% for the filling at the Tsuen Wan Bay Further Reclamation.
The rate of filling will be:

9,000 $m^3$/day for a 12 hour working day which gives a filling rate of 0.208 $m^3$/s.

The typical dry density of sandfill material is in the range 1,500kg/$m^3$ - 1,700kg/$m^3$. If we assume the larger value for the dry density and a loss value of 2.77% the rate of sediment lost to suspension is as follows :

354.17kg/s fill rate which gives a loss rate of 9.81kg/s.

Filling for Sand Blanket

The rate of filling for the sand blanket at this stage of the construction programme will be carried out by a single barge at a rate of 4,500$m^3$/day which is half that of the filling on top of the dumped mud. The loss rate will thus be 4.91kg/s.

## Input of Sediment Loss to SEDPLUME Model

For each of the dredging, dumping and filling on top of the dumped mud two loss points will be used to simulate the two pieces of plant operating for each activity, while the filling for the and blanket will be carried out by a single barge and will be simulated by a single loss point.

### Dredging

Coordinates of the loss points : 1. 828735mE 825475mN
2. 828980mE 825470mN

Loss rate at each point = 2.12kg/s

### Dumping

Coordinates of the loss points : 1. 828750mE 825600mN
2. 828950mE 825600mN

Loss rate at each point = 2.12kg/s

### Filling on Top of Dumped Mud

Coordinates of the loss points : 1. 828750mE 825750mN
2. 828950mE 825750mN

Loss rate at each point = 4.91kg/s

### Filling for Sand Blanket

Coordinates of the loss points : 3. 828625mE 825670mN

Loss rate = 4.91kg/s

The duration of loss for each of the activities will be 12 hours.

# APPENDIX D

## MUD CONTAMINATION (LABORATORY TEST REPORT)

GEOTECHNICS & CONCRETE ENGINEERING (H.K.) LTD.
6 KO SHAN RD., GROUND FL., HUNG HOM, KOWLOON, HONG KONG.
TEL.: 2365 9123-6, 2333 6482 FAX NO.: 852-2765 8034

香港土力混凝土工程有限公司
九龍紅磡高山道六號地下
電話：2365 9123-6, 2333 6482

# MATERIAL TESTING LABORATORY

# REPORT

# ON

LABORATORY TESTING

CONTRACT NO. GE/93/10

WORKS ORDER NO. GE/93/10.93

SITE: Tsuen Wan Bay Further Reclamation

CLIENT: Geotechnical Engineering Office

CONTRACT/JOB NO: GCE/GE/95058

Report no. GE 96020001

DATE: 3rd February 1996

CERTIFIED:

JACKEL Y. K. SHAM

Manager

# Contract Data Summary

| | | |
|---|---|---|
| Project Name & No. | Site Name Tsuen Wan Bay Further Reclamation | Date: to<br>Official only |
| G.I. Contractor Bachy Soletanche Group | Client NT West, TDO | G.E.O. Data Bank No. |
| Contract No. GE/93/11 | W.O. No. GE/93/11.50 | File Ref. |

# Field Work Summary

| | | |
|---|---|---|
| Drillholes Total No. | Method: | Date: to |
| Pits / Trenches / Caissons: No. | | |
| Probes : No. | | |
| Piezometers : No. | | |
| Insitu Tests : No. | Types | |
| Geophysics : Traverses | Type | |

# Laboratory Testing Summary

Total No. of Tests : 469 — Date 1-12-95 to 31-1-96

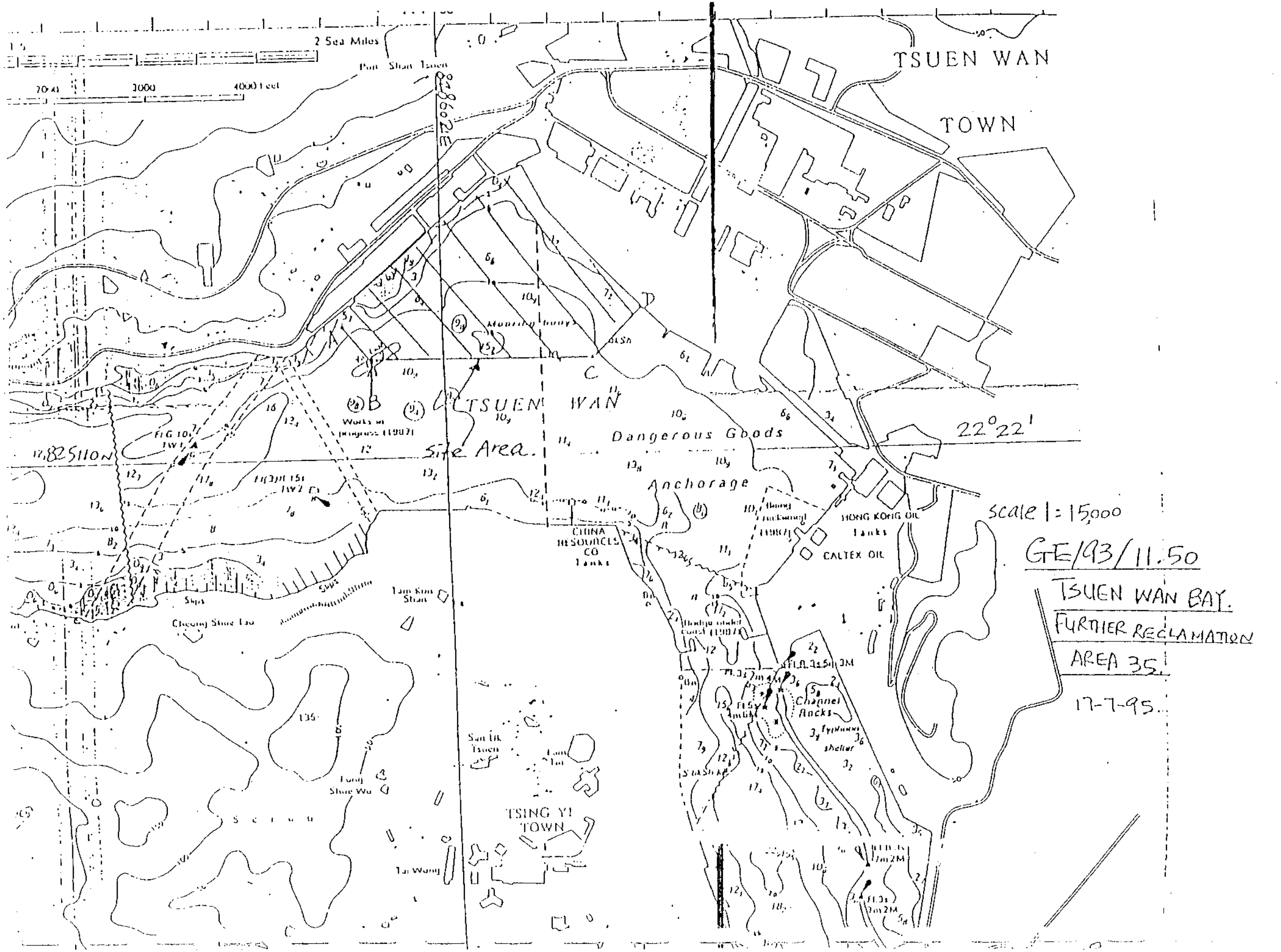
| | | | | | |
|---|---|---|---|---|---|
| Soil | Physical Properties | LL | PL | PSD | MC |
| | | SG | $\gamma_b/\gamma_d$ | | |
| | Strength Tests | CU | CD | UU | Shear Box |
| | Compaction & CBR Tests | Standard | Modified | | CBR |
| | Oedometer & Perm. Tests | Cv | k | COD 22 | Nitrate 22 |
| | Others Cd 57 Cr 57 | Cu 57 Ni 57 | Pb 57 Zn 57 | Hg 57 PAH 13 | PCB 13 |
| Rock | $\gamma$ | Pt load | UC | Shear Box | US Vel. |

Location Plan — SCALE 1 : 20 000 / 5 000 — Derived from : 20 000 Sheet ______ 5 000 Sheet ______

N

Attach 1: 5000 or 1:20 000 plan in this space
(see next page)

| | G. I. | Laboratory | GEOTECHNICAL ENGINEERING OFFICE |
|---|---|---|---|
| Contractor | Bachy Soletanche Group | G.C.E. | CIVIL ENGINEERING DEPARTMENT HONG KONG |
| Works Order No. | GE/93/11.50 | GE/93/10.93 | |


TSUEN WAN
TOWN
2 Sea Miles
4000 Feet
Pun Shan Tsuen
822602E
TSUEN WAN
Dangerous Goods
Anchorage
Site Area.
Works in progress (1987)
Mooring buoys
22°22'
812S110N
CHINA RESOURCES CO Tanks
HONG KONG OIL Tanks
CALTEX OIL
Channel Rocks
Typhoon shelter
Tam Kon Shan
Cheung Shue Tau
San Tin Tsuen
Tung Shue Wu
Tai Wong
TSING YI TOWN
scale 1:15,000
GE/93/11.50
TSUEN WAN BAY.
FURTHER RECLAMATION
AREA 35.
17-7-95.

CONTENTS

(1) HEAVY METAL ANALYSIS - Cr, Cu, Ni, Pb, Zn, Hg

(2) HEAVY METAL ANALYSIS - Cd

(3) COMPOSITE SEDIMENT SAMPLES - PCB CONTENT

(4) COMPOSITE SEDIMENT SAMPLES - PAH CONTENT

(5) ELUTRIATE OF COMPOSITE SAMPLES- COD & NITRATE

(6) ELUTRIATE OF COMPOSITE SAMPLES - PCB CONTENT

(7) ELUTRIATE OF COMPOSITE SAMPLES - PAH CONTENT

(1) HEAVY METAL ANALYSIS - Cr, Cu, Ni, Pb, Zn, Hg

# Inchcape Testing Services
Labtest

Issuing Laboratory:
Inchcape Testing Services Hong Kong Limited




HOKLAS
Registration No.5

Inchcape Testing Services Hong Kong Ltd.
(Formerly Known as Labtest Hong Kong Ltd)
2/F, Garment Centre
576 Castle Peak Road
Kowloon, Hong Kong
Telephone (852) 2746 8600
Fax (852) 2786 1903

## TEST REPORT

APPLICANT: GEOTECHNICS & CONCRETE
ENGINEERING (HK) LTD
G/F 6 KO SHAN RD
HUNGHOM
KLN HK
ATTN.: JACKEL Y. K. SHAM

NUMBER: TFH135025/A

DATE: FEB 01, 1996

SAMPLE DESCRIPTION:
FIFTY SEVEN (57) SUBMITTED SAMPLES SAID TO BE SEDIMENTS :
CONTRACT NO. GE/93/10
WORKS ORDER NO. CE/93/10.93
PROJECT : TSUEN WAN BAY FURTHER RECLAMATION LABORATORY TESTING - HEAVY METAL ANALYSIS
**********************************************************************

TESTS CONDUCTED:
AS REQUESTED BY THE APPLICANT, FOR DETAILS REFER TO ATTACHED PAGE(S)
**********************************************************************

PREPARED AND CHECKED BY:
FOR INCHCAPE TESTING SERVICES HK LTD

ELIZA L.F. CHAN
SENIOR MANAGER
HOKLAS APPROVED SIGNATORY

# Inchcape Testing Services
Labtest

Issuing Laboratory:
Inchcape Testing Services Hong Kong Limited


This Laboratory is accredited by the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific tests and/or measurements and the results shown in this report have been determined in accordance with the laboratory's terms of accreditation.

HOKLAS
Registration No.5


Inchcape Testing Services Hong Kong Ltd.
(Formerly Known as Labtest Hong Kong Ltd)
2/F, Garment Centre
576 Castle Peak Road
Kowloon, Hong Kong
Telephone (852) 2746 8600
Fax (852) 2786 1903


TEST REPORT

TESTS CONDUCTED

NUMBER: TFH135025/A

1 TEST RESULT

| SAMPLE I.D. | Cr (mg/kg) | Cu (mg/kg) | Ni (mg/kg) | Pb (mg/kg) | Zn (mg/kg) | Hg (mg/kg) |
|---|---|---|---|---|---|---|
| VC1 A | 360 | 1500 | 180 | 130 | 510 | 0.7 |
| VC1 B | 320 | 1200 | 170 | 100 | 270 | 0.6 |
| VC1 C | 130 | 59 | 17 | 92 | 210 | 0.7 |
| VC1 D | 24 | 7 | 15 | 22 | 63 | <0.1 |
| VC1 E | 25 | 10 | 15 | 26 | 62 | <0.1 |
| VC1 F | 10 | 4 | 5 | 24 | 37 | <0.1 |
| VC2 A | 880 | 3100 | 370 | 120 | 460 | 0.5 |
| VC2 B | 190 | 950 | 100 | 89 | 230 | 0.4 |
| VC2 C | 57 | 38 | 19 | 46 | 110 | <0.1 |
| VC2 D | 110 | 91 | 30 | 88 | 250 | 0.6 |
| VC2 E | 26 | 10 | 15 | 28 | 71 | <0.1 |
| VC2 F | 14 | 3 | 5 | 93 | 98 | <0.1 |
| VC2 G | 7 | 1 | 5 | 98 | 160 | <0.1 |
| VC3 A | 310 | 1200 | 170 | 140 | 300 | 0.9 |
| VC3 B | 140 | 120 | 33 | 92 | 280 | 1.1 |
| VC3 C | 33 | 14 | 10 | 52 | 86 | 0.5 |
| VC3 D | 31 | 10 | 19 | 25 | 67 | <0.1 |
| VC3 E | 30 | 11 | 18 | 31 | 71 | <0.1 |
| VC3 F | 8 | 4 | 3 | 50 | 59 | <0.1 |
| VC4 A | 450 | 1400 | 130 | 78 | 300 | 0.4 |
| VC4 B | 26 | 96 | 9 | 79 | 90 | <0.1 |

# Inchcape Testing Services
Labtest

Issuing Laboratory:
Inchcape Testing Services Hong Kong Limited

This Laboratory is accredited by the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific tests and/or measurements and the results shown in this report have been determined in accordance with the laboratory's terms of accreditation.

HOKLAS
Registration No.5

Inchcape Testing Services Hong Kong Ltd.
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2/F, Garment Centre
576 Castle Peak Road
Kowloon, Hong Kong
Telephone (852) 2746 8600
Fax (852) 2786 1903

TEST REPORT

TESTS CONDUCTED

NUMBER: TFH135025/A

| SAMPLE I.D. | Cr (mg/kg) | Cu (mg/kg) | Ni (mg/kg) | Pb (mg/kg) | Zn (mg/kg) | Hg (mg/kg) |
|---|---|---|---|---|---|---|
| VC4 C | 420 | 2000 | 280 | 170 | 480 | 0.6 |
| VC4 D | 17 | 7 | 8 | 29 | 52 | <0.1 |
| VC4 E | 9 | 4 | 2 | 28 | 100 | <0.1 |
| VC4 F | 5 | 2 | 2 | 12 | 140 | <0.1 |
| VC5 A | 190 | 630 | 77 | 61 | 210 | 0.3 |
| VC5 B | 360 | 1600 | 160 | 82 | 310 | 0.5 |
| VC5 C | 230 | 1100 | 99 | 89 | 270 | 0.3 |
| VC5 D | 210 | 110 | 22 | 89 | 280 | 1.0 |
| VC5 E | 20 | 10 | 8 | 64 | 100 | <0.1 |
| VC5 F | 7 | 7 | 1 | 60 | 250 | 0.2 |
| VC6 A | 160 | 430 | 57 | 52 | 170 | 0.2 |
| VC6 B | 280 | 1200 | 130 | 70 | 260 | 0.6 |
| VC6 C | 460 | 3100 | 540 | 130 | 550 | 0.6 |
| VC6 D | 88 | 230 | 30 | 61 | 140 | 0.4 |
| VC6 E | 14 | 3 | 3 | 67 | 80 | <0.1 |
| VC7 A | 270 | 760 | 82 | 67 | 220 | <0.1 |
| VC7 B | 24 | 19 | 7 | 56 | 71 | <0.1 |
| VC7 C | 5 | 5 | 2 | 50 | 73 | <0.1 |
| VC7 D | 3 | 5 | 1 | 82 | 72 | <0.1 |
| VC7 E | 3 | 3 | 1 | 50 | 69 | <0.1 |
| VC8 A | 370 | 1700 | 190 | 96 | 340 | 0.3 |
| VC8 B | 500 | 3400 | 470 | 130 | 460 | 0.8 |
| VC8 C | 350 | 1100 | 140 | 110 | 340 | 0.7 |

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Fax (852) 2786 1903

TEST REPORT

TESTS CONDUCTED

NUMBER: TFH135025/A

| SAMPLE I.D. | Cr (mg/kg) | Cu (mg/kg) | Ni (mg/kg) | Pb (mg/kg) | Zn (mg/kg) | Hg (mg/kg) |
|---|---|---|---|---|---|---|
| VC8 D | 23 | 8 | 13 | 26 | 73 | <0.1 |
| VC8 E | 12 | 7 | 5 | 51 | 86 | <0.1 |
| VC8 F | 11 | 3 | 2 | 51 | 63 | <0.1 |
| VC9 A | 29 | 81 | 11 | 78 | 57 | <0.1 |
| VC9 B | 12 | 4 | 6 | 16 | 42 | <0.1 |
| VC9 C | 10 | 4 | 3 | 31 | 58 | <0.1 |
| VC9 D | 8 | 4 | 3 | 43 | 55 | <0.1 |
| VC9 E | 15 | 10 | 6 | 65 | 130 | <0.1 |
| VC10 A | 150 | 520 | 55 | 88 | 220 | 0.3 |
| VC10 B | 14 | 7 | 7 | 23 | 46 | <0.1 |
| VC10 C | 12 | 5 | 6 | 28 | 49 | <0.1 |
| VC10 D | 11 | 6 | 5 | 66 | 94 | <0.1 |
| VC10 E | 7 | 4 | 3 | 65 | 84 | <0.1 |

REMARK : < = LESS THAN
ALL THE RESULTS ARE EXPRESSED ON A DRY WEIGHT BASIS.

DATE SAMPLE RECEIVED : DEC 5, 1995
DATE TEST STARTED : DEC 5, 1995

**************************************************************

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Registration No.5

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TEST REPORT

ESTS CONDUCTED NUMBER: TFH135025/A

2 METHODOLOGY

| TESTING ITEM | METHODOLOGY |
|---|---|
| COPPER<br>CHROMIUM<br>LEAD<br>NICKEL<br>ZINC | AS PER IN-HOUSE METHOD WC087.TP BASED ON AMERICAN SOCIETY FOR TESTING AND MATERIALS D3974-90 STANDARD PRACTICES FOR EXTRACTION OF TRACE ELEMENTS FROM SEDIMENTS, PRACTICES A, BY ATOMIC ABSORPTION SPECTROMETRY. |
| MERCURY | AS PER IN-HOUSE METHOD WC088.TP BASED ON STANDARD METHOD FOR THE EXAMINATION OF WATER & WASTEWATER, 18th EDITION, BY APHA, PART 3112B. BY COLD VAPOUR ATOMIC ABSORPTION SPECTROMETRY. |

****************************************************************************

(2) HEAVY METAL ANALYSIS - Cd

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## TEST REPORT

APPLICANT: GEOTECHNICS & CONCRETE ENGINEERING (HK) LTD
G/F 6 KO SHAN RD
HUNGHOM
KLN HK
ATTN.: JACKEL Y. K. SHAM

NUMBER: TFH135025/B

DATE: FEB 01, 1996

SAMPLE DESCRIPTION:
FIFTY-SEVEN (57) SUBMITTED SAMPLES SAID TO BE **SEDIMENTS** :
CONTRACT NO. GE/93/10
WORKS ORDER NO. CE/93/10.93
PROJECT : TSUEN WAN BAY FURTHER RECLAMATION LABORATORY TESTING - HEAVY METAL ANALYSIS

*************************************************************************

TESTS CONDUCTED:
AS REQUESTED BY THE APPLICANT, FOR DETAILS REFER TO ATTACHED PAGE(S)

*************************************************************************



PREPARED AND CHECKED BY:
FOR INCHCAPE TESTING SERVICES HK LTD

ANDREW S.K. TANG
GENERAL MANAGER

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# TEST REPORT

TESTS CONDUCTED

NUMBER: TFH135025/B

1 TEST RESULT

A) CADMIUM CONTENT IN SEDIMENT

| SAMPLE I.D. | Cd (mg/kg) | SAMPLE I.D. | Cd (mg/kg) |
|---|---|---|---|
| VC1 A | 2.4 | VC5 E | 0.4 |
| VC1 B | 2.0 | VC5 F | <0.2 |
| VC1 C | 7.1 | VC6 A | 0.7 |
| VC1 D | <0.2 | VC6 B | 4.1 |
| VC1 E | <0.2 | VC6 C | 1.9 |
| VC1 F | <0.2 | VC6 D | 0.6 |
| VC2 A | 2.8 | VC6 E | <0.2 |
| VC2 B | 1.1 | VC7 A | 1.4 |
| VC2 C | 0.9 | VC7 B | 0.5 |
| VC2 D | 1.5 | VC7 C | 0.6 |
| VC2 E | <0.2 | VC7 D | <0.2 |
| VC2 F | <0.2 | VC7 E | <0.2 |
| VC2 G | <0.2 | VC8 A | 2.7 |
| VC3 A | 2.0 | VC8 B | 3.6 |
| VC3 B | 1.7 | VC8 C | 1.4 |
| VC3 C | 0.6 | VC8 D | <0.2 |
| VC3 D | <0.2 | VC8 E | 0.4 |
| VC3 E | <0.2 | VC8 F | <0.2 |
| VC3 F | <0.2 | VC9 A | 0.4 |
| VC4 A | 1.7 | VC9 B | <0.2 |
| VC4 B | <0.2 | VC9 C | <0.2 |
| VC4 C | 1.4 | VC9 D | <0.2 |
| VC4 D | <0.2 | VC9 E | <0.2 |
| VC4 E | <0.2 | VC10 A | 1.0 |
| VC4 F | <0.2 | VC10 B | <0.2 |
| VC5 A | 1.1 | VC10 C | <0.2 |
| VC5 B | 13 | VC10 D | 0.3 |
| VC5 C | 1.0 | VC10 E | <0.2 |
| VC5 D | 2.6 | | |

**********************************************************************

(3) COMPOSITE SEDIMENT SAMPLES - PCB CONTENT

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TEST REPORT

TESTS CONDUCTED

NUMBER: TFH135025/B

B) PCB CONTENT IN COMPOSITE SEDIMENT SAMPLES

| PCB COMPOUND | RESULT IN µg/kg | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VC5 ABC | AC5 DEF | AC8 ABC | VC8 DEF | VC9 ABC | VC9 DE | VC10 ABC | VC10 DE |
| AROCLOR 1016 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| AROCLOR 1221 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| AROCLOR 1232 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| AROCLOR 1242 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| AROCLOR 1248 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| AROCLOR 1254 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |
| AROCLOR 1260 | <100 | <100 | <100 | <100 | <100 | <100 | <100 | <100 |

*************************************************************************

(4) COMPOSITE SEDIMENT SAMPLES - PAH CONTENT

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## TEST REPORT

TESTS CONDUCTED

NUMBER: TFH135025/B

C) PAH CONTENT IN COMPOSITE SEDIMENT SAMPLES

| PAH COMPOUND | RESULT IN mg/kg | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VC5 ABC | VC5 DEF | VC8 ABC | VC8 DEF | VC9 ABC | VC9 DE | VC10 ABC | VC10 DE |
| NAPHTHALENE | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |
| ACENAPHTHYLENE | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |
| ACENAPHTHENE | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |
| FLUORENE | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |
| PHENANTHRENE | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |
| ANTHRACENE | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |
| FLUORANTHENE | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |
| PYRENE | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |
| BENZO(A)ANTHRACENE | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |
| CHRYSENE | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |
| BENZO(B)FLUORANTHENE | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |
| BENZO(K)FLUORANTHENE | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |
| BENZO(A)PYRENE | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |
| INDENO(123-CD)PYRENE | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |
| DIBENZO(AH)ANTHRACENE | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |
| BENZO(GHI)PERYLENE | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 | <0.3 |

**************************************************************************

(5) ELUTRIATE OF COMPOSITE SAMPLES- COD & NITRATE

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# TEST REPORT

TESTS CONDUCTED

NUMBER: TFH135025/B

D) COD & NITRATE CONTENT OF ELUTRIATE OF COMPOSITE SAMPLES

| SAMPLE I.D. | COD CONTENT mg/kg | NITRATE CONTENT mg/kg |
|---|---|---|
| VC1 ABC | 630 | 5 |
| VC1 DEF | 300 | 3 |
| VC2 ABC | 870 | 2 |
| VC2 DEFG | 540 | 2 |
| VC3 ABC | 530 | 1 |
| VC3 DEF | 380 | 2 |
| VC4 ABC | 900 | <1 |
| VC4 DEF | 160 | 2 |
| VC5 ABC | 690 | 1 |
| VC5 DEF | 440 | <1 |
| VC6 ABC | 2100 | 3 |
| VC6 DE | 550 | 1 |
| VC7 ABC | 370 | 2 |
| VC7 DE | 66 | 3 |
| VC8 ABC | 1000 | 2 |
| VC8 DEF | 250 | 1 |
| VC9 A | 100 | 3 |
| VC9 BC | 33 | <1 |
| VC9 DE | 98 | 4 |
| VC10 ABC | 280 | <1 |
| VC10 DE | 110 | 1 |

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(6) ELUTRIATE OF COMPOSITE SAMPLES - PCB CONTENT

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# TEST REPORT

TESTS CONDUCTED

NUMBER: TFH135025/B

E) PCB CONTENT OF ELUTRIATE OF COMPOSITE SAMPLES

| PCB COMPOUND | RESULT IN µg/kg | | | | |
|---|---|---|---|---|---|
| | VC1 ABC, VC2 ABC, VC3 ABC | VC1 DEF, VC2 DEF, VC3 DEF | VC4 ABC, VC6 ABC, VC7 ABC | VC4 DEF, VC6 DE, VC7 DE | ELUTRIATE BLANK (µg/L) |
| AROCLOR 1016 | <100 | <100 | <100 | <100 | <10 |
| AROCLOR 1221 | <100 | <100 | <100 | <100 | <10 |
| AROCLOR 1232 | <100 | <100 | <100 | <100 | <10 |
| AROCLOR 1242 | <100 | <100 | <100 | <100 | <10 |
| AROCLOR 1248 | <100 | <100 | <100 | <100 | <10 |
| AROCLOR 1254 | <100 | <100 | <100 | <100 | <10 |
| AROCLOR 1260 | <100 | <100 | <100 | <100 | <10 |

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(7) ELUTRIATE OF COMPOSITE SAMPLES - PAH CONTENT

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TEST REPORT

NUMBER: TFH135025/B

TESTS CONDUCTED

F) PAH CONTENT OF ELUTRIATE OF COMPOSITE SAMPLES

| PAH COMPOUND | RESULT IN mg/kg | | |
|---|---|---|---|
| | VC1 ABC, VC2 ABC, VC3 ABC | VC1DEF, VC2 DEF, VC3 DEF | VC4 ABC, VC6 ABC, VC7 ABC |
| NAPHTHALENE | <0.3 | <0.3 | <0.3 |
| ACENAPHTHYLENE | <0.3 | <0.3 | <0.3 |
| ACENAPHTHENE | <0.3 | <0.3 | <0.3 |
| FLUORENE | <0.3 | <0.3 | <0.3 |
| PHENANTHRENE | <0.3 | <0.3 | <0.3 |
| ANTHRACENE | <0.3 | <0.3 | <0.3 |
| FLUORANTHENE | <0.3 | <0.3 | <0.3 |
| PYRENE | <0.3 | <0.3 | <0.3 |
| BENZO(A)ANTHRACENE | <0.3 | <0.3 | <0.3 |
| CHRYSENE | <0.3 | <0.3 | <0.3 |
| BENZO(B)FLUORANTHENE | <0.3 | <0.3 | <0.3 |
| BENZO(K)FLUORANTHENE | <0.3 | <0.3 | <0.3 |
| BENZO(A)PYRENE | <0.3 | <0.3 | <0.3 |
| INDENO(123-CD)PYRENE | <0.3 | <0.3 | <0.3 |
| DIBENZO(AH)ANTHRACENE | <0.3 | <0.3 | <0.3 |
| BENZO(GHI)PERYLENE | <0.3 | <0.3 | <0.3 |

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TEST REPORT

TESTS CONDUCTED NUMBER: TFH135025/B

F) PAH CONTENT OF ELUTRIATE OF COMPOSITE SAMPLES (COND'T)

| PAH COMPOUND | RESULT IN mg/kg | |
|---|---|---|
| | VC4 DEF, VC6 DE, VC7 DE | ELUTRIATE BLANK - (μg/L) |
| NAPHTHALENE | <0.3 | <10 |
| ACENAPHTHYLENE | <0.3 | <10 |
| ACENAPHTHENE | <0.3 | <10 |
| FLUORENE | <0.3 | <10 |
| PHENANTHRENE | <0.3 | <10 |
| ANTHRACENE | <0.3 | <10 |
| FLUORANTHENE | <0.3 | <10 |
| PYRENE | <0.3 | <10 |
| BENZO(A)ANTHRACENE | <0.3 | <10 |
| CHRYSENE | <0.3 | <10 |
| BENZO(B)FLUORANTHENE | <0.3 | <10 |
| BENZO(K)FLUORANTHENE | <0.3 | <10 |
| BENZO(A)PYRENE | <0.3 | <10 |
| INDENO(123-CD)PYRENE | <0.3 | <10 |
| DIBENZO(AH)ANTHRACENE | <0.3 | <10 |
| BENZO(GHI)PERYLENE | <0.3 | <10 |

REMARK : < = LESS THAN

ALL THE RESULTS ARE EXPRESSED ON A DRY WEIGHT BASIS.

DATE SAMPLE RECEIVED : DEC 5, 1995
DATE TEST STARTED : DEC 5, 1995
*********************************************************************

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## TEST REPORT

TESTS CONDUCTED

NUMBER: TFH135025/B

2 METHODOLOGY

| TESTING ITEM | METHODOLOGY |
|---|---|
| CADMIUM | AS PER IN-HOUSE METHOD WC087.TP BASED ON AMERICAN SOCIETY FOR TESTING AND MATERIALS D3974-90 STANDARD PRACTICES FOR EXTRACTION OF TRACE ELEMENTS FROM SEDIMENTS, PRACTICES A, BY ATOMIC ABSORPTION SPECTROMETRY. |
| PAH | AS PER USEPA 8270A GC/MSD |
| PCB | AS PER USEPA 8081 GC/ECD |
| COD | AS PER *STANDARD METHOD FOR THE EXAMINATION OF WATER & WASTEWATER*, APHA, $18^{th}$ ED, PART 5220B |
| NITRATE | AS PER *STANDARD METHOD FOR THE EXAMINATION OF WATER & WASTEWATER*, APHA, $18^{th}$ ED, PART 4500-$NO_3$ B/E |

3 SAMPLE PREPARATION

A) ELUMTRATE PREPARATION

SEDIMENTS AND UNFILTERED SITE WATER WERE MIXED IN A RATIO 1:4 IN A FLASK. THE FLASK WAS THEN CAPED TIGHTLY AND SHAKED FOR 30 MINS. THEN THE MIXTURE WAS SETTLED FOR 1 HOUR. AFTER SETTLING, THE SUPERNATANT WAS FILTERED THROUGH A ACID-SOAKED 0.45 μm PORE-SIZE MEMBRANE FILTER FOR FURTHER ANALYSIS.

B) COMPOSITE SAMPLE PREPARATION

THE SEDIMENTS WERE MIXED ACCORDING TO THE CLIENT'S INSTRUCTION ON AN EQUAL DRY WEIGHT BASIS TO PRODUCE THE COMPOSITE SAMPLES FOR ELUTRIATE AND PAH & PCB TESTING.

**************************************************************

# APPENDIX E

## COMMENTS AND RESPONSES

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

1. Agriculture and Fisheries Department
2. Architectural Services Department
3. Civil Engineering Department
4. District Office (Tsuen Wan)
5. District Planning Office - Tsuen Wan, Kwai Tsing & Sham Shui Po
6. District Planning Office - Tsuen Wan, Kwai Tsing & Sham Shui Po
7. Drainage Services Department
8. Environmental Protection Department
9. Environmental Protection Department
10. Environmental Protection Department
11. Environmental Protection Department
12. Environmental Protection Department
13. Environmental Protection Department
14. Environmental Protection Department
15. Fire Services Department
16. Fire Services Department
17. Highways Department (D&M)
18. Highways Department (Landscape Unit)
19. Highways Department (RDO)
20. Housing Authority
21. Housing Authority
22. Kowloon-Canton Railway Corporation
23. Lands Department - District Lands Office, Tsuen Wan
24. Lands Department - District Lands Office, Tsuen Wan
25. Marine Department
26. Regional Services Department
27. Transport Department
28. Water Supplies Department
29. Water Supplies Department
30. Water Supplies Department
31. Water Supplies Department

| Comments Received | | | Consultant's Responses |
|---|---|---|---|
| 1 | Agriculture & Fisheries Department<br>Date : 18- 9-97<br>Ref: (52) in AF DVL 10/1 Annex E III | | |
| 1.1 | I refer to your memo under reference and have no comment. | | Noted |
| 2 | Architectural Services Department<br>Date : 8-12-97<br>Ref: ADS 53/96250/PLN | | |
| 2.1 | I refer to your fax dated 3.12.1997 and the telecon with your Mr. Kin Tso / C. Kwok on 5.12.1997. | | |
| 2.2 | Mr comments on your proposal for the schools using school boundary walls as noise mitigation are as follows: | | |
| | (a) | We need to know the completion dates for schools and the basis of the traffic data used in your calculation as these have implication on the effectiveness of the proposed measures. | The occupation date for the development areas are:<br>Area — Occupation Date<br>104 (Rental) — 2008/2009<br>101 / 102 (PSPS) — 2009/2010<br>105 (Comm.) — 2009/2010<br>103 (R1) — 2009/2010<br>The current assessment was carried out using 2011 traffic data, which represents the best available information during the time of assessment, and the use of 2011 data was agreed by the Environmental Study Management Group members of the study. Up-dated data would be used to review the findings in the detailed design of the project. |
| | (b) | Will the schools be built by ASD or HD. I understand you have asked HD to comment as well. | The schools would be built by ASD. |

| | Comments Received | Consultant's Responses |
|---|---|---|
| | (c) The maximum height of the said boundary wall should be kept to 2.7m as far as possible. | The height of the boundary walls would be reviewed and kept to 2.7m as far as possible during the detailed design stage. |
| 3 | Civil Engineering Department<br>Date : 23-10-97<br>Ref: (25) in TS CG/CE26 (94). O PT.05 | |
| 3.1 | I have no comments on the Draft EIA Final Assessment Report attached to the memo from Project Manager (NT West), Territories Development Department, ref (53) in NTW 2/299CL/3 Pt.14. | Noted. |
| 4 | District Office (Tsuen Wan)<br>Date : 22-9-97<br>Ref: (80) in TWD/1/35 VIII | |
| 4.1 | We have no particular comment to the EIA Final Report. We would appreciate if you could ensure proper consultation with DB be done as you proceed on with the project. | Noted. |
| 5 | District Planning Office - Tsuen Wan, Kwai Tsing & Sham Shui Po<br>Date : 6-10-97<br>Ref: ( ) in PD/TKS D/TWC/002 | |
| 5.1 | I refer to your MUR and our telephone conversation on 22.9.97. You have asked me to contact Dr Antony Lee of CES (Asia) Ltd. Regarding the "missing" student day-time population in the Yau Kom Tau Water Treatment Works risk assessment (Table 3.12 of p. 3/22), he informed me that the sub-consultant is located overseas and it may take some time to clarify this point. This memo therefore served as an interim reply only. | The risk assessment had assumed that there will be altogether 4162 students on the reclaimed land. |

| | Comments Received | Consultant's Responses |
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| 6 | District Planning Office - Tsuen Wan, Kwai Tsing & Sham Shui Po<br>Date: 14-11-1997<br><u>Ref: ( ) in PD/TKS D/TWC/002</u> | |
| 6.1 | As stated in p.14 of Maunsell's letter of 31.10/97, the student population for the 2 primary and 2 secondary schools are assumed to be 4162 which should be further confirmed with D of Education so as to ascertain its validity. | Validity of the assumed figure has been confirmed with D of Education. |
| 7 | Drainage Services Department<br>Date : 10-9-97<br><u>Ref: ( ) in MS 8/CE/2694</u> | |
| 7.1 | I have no comment on the details of the captioned report. | Noted. |
| 8 | Environmental Protection Department<br>Date : 6-10-97<br><u>Ref: ( ) in EP2/N2/32 (XIII)</u> | |
| 8.1 | We refer to your memo under reference. The comments on the draft EIA final assessment report, except those on noise issue are listed below. The out-standing comments on noise assessment are being reviewed by our Dr K K Lau (tel: 2594 6551). | Noted. |
| 8.2 | With reference to the Key Issue Report, there are four outstanding tasks for the Air Quality Assessment including:<br>• construction dust;<br>• odour from dredging;<br>• industrial emissions; and<br>• secondary traffic emissions impacts from noise mitigation measures (e.g. enclosures). | |

| | Comments Received | Consultant's Responses |
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| 8.2.a | Please clarify why we cannot find out any assessment for odour from dredging in this draft EIA final Assessment Report. | Qualitative assessment for odour from dredging is prepared for review by EPD and will be included in the final report. |
| 8.2.b | For secondary traffic emissions impacts from noise mitigation measures, apart from the tunnel and ventilation stack, please clarify whether there are other noise mitigation measures recommended in this Report that would have air concern. | The secondary traffic emissions impacts from noise mitigation measures including noise barriers have been considered in the assessment. |
| 8.3 | The following are particular comments on the Air Quality Assessment, please clarify and amend the Report as appropriate. | |
| 8.3.a | *Section 3.5.5 page 3/5*<br>The Consultants should confirm with TDD whether the assumption of a maximum of 30% of the construction site area will be actively operated at any one time during the construction period is a reasonable estimate. | We receive no comment from TDD on this assumption and the assumption has been used in other environmental assessments of similar nature and is considered as a reasonable estimate. |
| 8.3.b | *Section 3.5.7 and 3.6.13*<br>The Consultants might have underestimated the impact of the construction phase and industrial emissions by using inappropriate wind speed measurement height. The correct height for Ching Pak House (Tsing Yi) station is 136m as opposed to the 10m and 17.7m used in the FDM (Table B1.3) and ISCST model (Table B3.2) respectively. Please check carefully and revise the assessment accordingly. | The height for Ching Pak House (Tsing Yi) station is 136 mPD but the wind measurement height is the height of the anemometer above local ground level at about 65m. The model is rerun with an anemometer height of 65m above local ground. The revised ISCST modelling results showed a 10-30% increase in predicted $SO_2$ concentrations at the sensitive receivers. Nevertheless, the modelling results showed that there is no significant change in the extent of the height restriction zone. The revised FDM results showed no change in predicted TSP concentrations. All the revised results will be presented in the final report. |
| 8.3.c | *Section 3.6.5 page 3/8*<br>The detailed calculations of the portal emissions rates should be provided. | The detailed calculations of the portal emissions rates will be provided. |

| | Comments Received | Consultant's Responses |
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| 8.3.d | *Section 6.2.1 page 6/2*<br>It is stated in section 3.6.5 that the ventilation shaft would be 10m above ground. Please clarify whether the prediction at 30m above ground represents the worst impact level of tunnel ventilation shaft emissions.<br><br>This is also inconsistent with the height of the ventilation shaft used in the air quality impact assessment. Referring to the sample of ISCST output file in Table B2.7, a value of 15m had been used. Please check and revise the assessment as appropriate. | Yes. The prediction at 30m above ground represents the worst impact level of tunnel ventilation shaft emissions.<br><br>The correct height of the ventilation shaft used in the assessment was 15m. The value stated in Section 3.5.5 will be corrected. |
| 8.3.e | *Section 6.2.4*<br>Please elaborate how the buffer distance of 100m between the ventilation shaft and ASR is calculated. This should preferably be presented in an air pollution contour map. | Base on the modelling results of stack emissions, the future sensitive receivers in the site will be located outside the height restriction zone. Therefore, to minimise the air quality impact, we have suggested a buffer distance of 100m which is about the maximum separation between the ASRs and the ventilation shaft. The actual buffer distance is around 30m. The calculation will be shown in the final report. |
| 8.3.f | *Section 6.2.5, 1st paragraph*<br>The recommendation, "future air sensitive receivers located within the zone should not be located higher than 100m above ground to avoid adverse air quality impacts from stack emissions" is inconsistent with the modelling prediction and is exceedance of AQOs at heights from 90m to 140m above ground due to stack emissions. Please clarify. | The recommendation will be revised based on the revised modelling results and will be incorporated in the final report. |
| 8.3.g | *Section 6.2.5, 2nd paragraph*<br>To avoid any further misunderstanding, the Consultant should state explicitly that "the height of future developments (i.e. the open space Area 102B) located within the height restriction zone are all below 90m and therefore the $SO_2$ concentrations at all ASRs will comply with the AQO". | Text amended accordingly. |
| 8.3.h | *Tables B4.3 and B4.4*<br>"$mg/m^3$" should read "$\mu g/m^3$". | Text amended. |

| | Comments Received | Consultant's Responses |
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| 8.3.i | *Section 6.3*<br>Apart from those dust suppression listed, the Consultants should take note of the Air Pollution Control (Construction Dust) Regulation. The contractors and site agents should observe the requirements in the Regulation during construction to mitigate construction dust problem. | Noted. |
| 8.3.j | *Section 6.3.1, last bullet point*<br>Please clarify whether the proposed control program to monitor the construction process ...... is an "EM&A" program. | Yes. |
| 8.4 | Our comments on the Risk Assessment are as follows: | |
| 8.4.a | *Para. 3.9.15*<br>Please delete the paragraph. Scope of application of the Risk Guidelines can be found in Chapter 11, section 4 of the Hong Kong Planning Standards and Guidelines. The Tsuen Wan Bay DGA should be relocated before reclamation hence it is outside the scope of this study. | Noted. Text will be amended. |
| 8.4.b | *Para. 3.9.16*<br>This is the view of the consultant looking at the development proposal in isolation only. Government's view on societal risk is on a cumulative basis. Intensification of development within consultation zones could have a significant impact on societal risk findings. Our view and our requirement have been conveyed to the consultant. | Assessment methodology had been given in the Environmental Final Assessment Report which was agreed by EPD. Assessment of the societal risks associated with YKT WTW to people within the TWB reclamation area had been carried out. Assessment of societal risk for population within CZ is considered outside the scope of work for the current study. |
| 8.4.c | *Table 3.12*<br>Population data provided for risk assessment for schools are considered too small. Population data for schools should take into account the number of students and not just workers. | 14% of the residential population (equivalent to 4162 persons) were assumed to be students and were included in the assessment (refer Table 3.13) |

| | Comments Received | Consultant's Responses |
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| | Transient population should be provided for open space and parks. Large number of people are likely to accumulate during festivals and holidays. | We will review the implication of transient population on the risk assessment. However, we would much appreciate if EPD can provide guidance on the envisaged number of people likely to accumulate during festivals and holidays. |
| 8.4.d | *Chapter 9*<br>There are confusion on the reference made to YKT Report. YKT Report seems referring to the *Yau Kam Tau Water Treatment Works Risk Assessment by Atkins in 1990* (reference 3 of Page 4/8), but all the referred figures, text etc. were inconsistent. | YKT Report as cited in Chapter 9 referred to *Feasibility Study for Castle Peak Road Improvements - Hazard Assessment Report* under Agreement no. CE 39/94. We apologise for the confusion and this will be clarified in the report. |
| 8.4.e | *Para. 9.1.1*<br>If the report is referring to the Atkins 1990 report, all the figures quoted are wrong. They are for unmitigated cases, ie without scrubber etc.. | refer to response to item 8.4d. |
| | Individual risk contours showing 10-5, 10-6 and 10-7 should be provided. Since this report is a stand-alone document, it must include all the relevant materials, findings and results to support the development application. | Individual risk contours had been shown in Figure 6.1 of the *Feasibility Study for Castle Peak Road Improvements - Hazard Assessment Report*. This will be reproduced in the final report. |
| 8.4.f | *Para. 9.2.1*<br>There is the same confusion here, the *Atkins 1990* report provided societal risk result for population within consultation zone should be updated. | refer to response to item 8.4d. |
| 8.4.g | *Para. 9.2.2/Table 9.1*<br>Please explain in detail what is the "initiating event" that could lead to release of all chlorine drums and what is the definition for maximum hazard range. | The last row of Table 9.1 represented the total likelihood of the six release rate scenarios. This will be clarified in the report. |
| | Risk assessment usually involves probit equation, representative toxic loads, weather conditions etc. for calculation. They are not discussed in the report. | These will be included in the final report. |

| | Comments Received | Consultant's Responses |
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| 8.4.h | *Para. 9.2.3*<br>The computer model used is not same as the one used in *Atkins 1990* report. If it is an in house developed models, please provide details of the model, results of validity test and application of model on other study (Hong Kong and Overseas). | The models adopted were *HEGADAS, & RPA risk calculators* and they had been applied on other studies like *Feasibility Study for Castle Peak Road Improvements, Ngau Tam Mei Water Treatment Works Hazard Assessment*, etc. The models and results had been independently reviewed by many risk assessment experts. |
| 8.4.i | *Table 9.2*<br>Please provide sample societal risk calculation for some release cases and cumulative societal risk FN curves for background planned population and planned population plus development. | refer to response to item 8.4b. |
| 8.4.j | *Section 9.3*<br>Please revise the section based on results of calculation and not based on Consultants' personal speculation. There is no "rule of thumb" guideline. Societal risk is a function of release frequency, inventory and population distribution. | The section will be revised based on assessment results. Footnote number 10 will be deleted. |
| 8.4.k | *Section 10.5*<br>Please revise section pending results of risk calculation using revised population data (see comments on Table 3.12). | refer to response to item 8.4b and c. |
| 8.5 | Our comments on Solid Waste and Mud Contamination Assessment are as follows: | |
| 8.5.a | *Section 3.8.2, 4th line*<br>The Government's Publication "Monitoring of Municipal Solid Waste in Hong Kong 1995" should read "*Monitoring of Solid Waste in Hong Kong 1995*". | Noted. Text will be amended. |
| 8.5.b | *Section 3.8.3, 2nd line*<br>Please delete "1980" after "Water Disposal Ordinance". | Noted. Text will be amended. |

| | Comments Received | Consultant's Responses |
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| 8.5.c | *Chapter 8*<br>Before considering the disposal options for various types of wastes, opportunities for reducing waste generation shall be fully evaluated, including avoidance/minimisation, reuse and recycling. Proper waste management practices should be recommended for the project. | Noted. Waste minimisation, reuse and recycling had been considered in the study. |
| | The quantity of solid waste arising from the proposed developments should be estimated as far as practicable. If large quantities of wastes are identified, the impact on the capacity of waste collection, transfer and disposal facilities, especially the existing or strategic solid waste disposal facilities have to be assessed. | The quantity of solid waste arising from the proposed developments had been estimated and assessed in the report. |
| 8.5.d | *Table 8.1, VC2*<br>The overall classification for the depth of sampling below seabed at 2.9-3.0m should not be A. Please amend. | Noted. Text will be amended. |
| 8.5.e | *Section 10.4.3*<br>The presentation in section 10.4.3 should be consistent with that in section 8.3, especially the figures such as 0.042 $Mm^3$ and 0.194$Mm^3$ which refer to the volumes to be dredged, including those from the area beneath seawall foundation. The disposal method of dredged mud should also be mentioned in this section. | Noted. Text will be amended. |
| 8.6 | We generally agree with the findings of the Water Quality Assessment that the proposed reclamation should not have insurmountable problem in terms of water quality. With the provision of proper mitigation measures the impacts, both during construction and operation, could be mitigated to within acceptable levels. | Noted. |
| 8.7 | We have the following specific comments on the Water Quality Assessment: | |
| 8.7.a | *Section 4.5.2*<br>It is stated that the annual mean of ammoniacal nitrogen recorded in 1995 at VM14 was 0.23mg/l and did not comply with the WQO, please check and amend if necessary. The standard of 0.021mg/l is for unionised ammonia and the level of ammoniacal nitrogen has to be converted to unionised ammonia first before it could be checked against the WQO. | Thanks for pointing out the mistake. Un-ionised ammonia recorded in 1995 at VM14 did comply with the relevant WQO. Text will be amended. |

| | Comments Received | Consultant's Responses |
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| 8.7.b | *Section 7.1.1*<br>The tentative programme shown on Figure 2.5 is illegible that should be converted to A3 size. Although the pollutant remaining in the stormdrains will be less than 10% of the pollutant load from the catchment with the implementation of the SMP works, early diversion of stormdrains to areas with good flushing is still strongly supported as a precautionary approach. | Noted. Legibility of Figure 2.5 will be improved. |
| | Therefore, early diversion of stormdrains should also be included in Section 7.3 as one of the measures to mitigate construction impacts. The implementation of these very important activities at the earliest opportunity should be clearly shown on the tentative programme. | Noted. |
| 8.7.c | *Section 7.1.6*<br>The SMP works are being implemented and there are still uncertainties on their effectiveness. We, therefore, strongly support the recommendation of reviewing the pollution status in storm drains by collecting field samples during the detailed design stage of this project, when the SMP works would have been completed. This would be particularly important for those storm drains which would be discharged into areas with low flushing capacity during the construction stage and the stormdrains located close to the proposed WSD's seawater intake. This recommendation should be included in Chapter 10 'Conclusions and Recommendation' to make sure that this will not be overlooked. | Noted. Text will be included in Chapter 10. |
| 8.7.d | *Section 7.1.18*<br>Please provide the time series plot for Ma Wan Mariculture zone which is one of the sensitive receivers identified. | Time series plot for Ma Wan mariculture zone is not available. However, from Figure 104, 105 and 109 of Appendix C, it can be shown that sediment plume during dredging and reclamation will not be transported to Ma Wan. This can also be reflected from the time series plots at the bathing beaches that are closer to the site than Ma Wan. |

| | Comments Received | Consultant's Responses |
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| 8.7.e | *Section 7.1.23 to 7.1.29*<br>Two different conditions, i.e. the dry spring and wet neap, have been modelled to assess the construction impacts. The modelling results indicate that the impacts on the sensitive receivers close to the site would be more severe during the wet neap condition, presumably due to lower flow speed through the channel. However, the consultants seem to assume that these differences are solely due to the difference in season. Then they concluded that if the dredging and filling works could be carried out during the dry season the impacts would not be significant. We could not agree with these comments, according to the hydraulic modelling results the tidal conditions will have comparable, if not more, effect on the flow speed when compared with the seasonal factors. As the dry neap condition has not been modelled, it will be inconclusive whether the impacts during dry season, under neap tide conditions other than spring tide, will be within acceptable limit. The text, which stated that the impacts would not be significant during dry season, including those in sections 7.3.1 and 10.3.5 should be revised. | We generally agree that it would be difficult to distinguish the effect of seasonal and tidal conditions on the modelling results. However, since dry season flow through the channel is in general greater than that in the wet season, it is reasonable to conclude that dredging impact during dry season will be less significant and it is preferably to carry out the works within a dry season period. Notwithstanding the comment above, it is still required to carry out environmental monitoring and appropriate mitigation measures as recommended in the report to minimise the impact. |
| 8.7.f | *Section 7.2.4*<br>With Tsuen Wan Bay in place the reduction in discharge volume through Victoria Harbour are less than 0.5% except during a wet season spring ebb tide (reduced by 1.77%). Please justify this exceptionally large impacts on the tidal flow in Victoria Harbour. | This larger predicted percentage change is probably a result due to the relatively smaller discharge volume through Victoria Harbour for a wet season spring ebb tide during baseline situation. The absolute predicted reduction in flow volume is not much difference between the wet spring ebb and flood tides. |
| 8.7.g | *Sections 8.1.10 to 8.1.12*<br>These are related to spillage of fuel and chemical and are considered to be water quality issues. It would be more appropriate to move these to Chapter 7. | Noted and text will be amended. |

| | Comments Received | Consultant's Responses |
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| 9 | Environmental Protection Department<br>Date : 16-10-97<br><u>Ref: ( ) in EP2/N2/32 (XIII)</u> | |
| 9.1 | Further to our memo of the same series dated 6 October 1997, the comments on noise assessment of the captioned report is below. If you have any queries, please contact our Dr K K Lau (tel: 2594 6551). | Noted. |
| 9.2 | *S.3.3.2, P.3/2* | |
| 9.2.a | With reference to the CRTN, road traffic noise prediction should be based on the peak hour traffic flow within the 15 years after the opening of the proposed roadworks. Therefore, please check whether the year 2011 traffic flow adopted for the study fulfil this requirement; | Noted. In the absence of traffic model results for future years, the year 2011 traffic data, which is the best available information in respect of traffic flow prediction, has been used in this noise assessment. The use of 2011 traffic flows was reported in Table 6.1 of the Draft Final Report issued on January 1997, and this issue will be clarified in the Final EIA Report. |
| 9.2.b | Traffic data used for traffic noise prediction should be provided for us as reference; and | Noted and traffic data will be provided. |
| 9.2.c | Traffic flow used should have Transport Department's endorsement. | Noted. Traffic flow used in this assessment was endorsed by Transport Department. |
| 9.3 | *S.3.3.4, P.3.2* | |
| 9.3.a | Combine the 2nd and 3rd sentences with the replacement of "Eligibility for indirect technical remedies" using "under" and the deletion of "and CRTN-derived criteria". | Noted and text will be amended. |
| 9.3.b | Replace "the predicted noise level" in criteria (ii) and "the noise level" in criteria (iii) using "the predicted overall noise level"; and | Noted and text will be amended. |
| 9.3.c | Delete "or improved road" in criteria (i) and (ii) as the improved road is already covered by the definition of new road in the study brief. | Noted and text will be amended. |

| | Comments Received | Consultant's Responses |
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| 9.4 | *S.3.4.3-S.3.4.8, P3/3-4* | |
| 9.4.a | The industrial noise from the existing industrial area should not be a dominant noise contributor at the proposed noise sensitive development in view of the large separation between the existing industrial area at the north of Hoi Shing Road, the PSPS Area 102A and RS Area 104A; and the high traffic noise levels from the nearby roads. Therefore, we consider that it is not necessary to check your assessment on industrial noise. Please advise if you do not agree with it; and | Noted and agreed. |
| 9.4.b | As shown in Figure B2.1, a ventilation shaft for the tunnel bypass is proposed within the reclamation. Therefore, the noise impact from this ventilation shaft on the nearby NSRs should be addressed in the report. | The noise impact from this ventilation shaft on nearby NSRs will be controlled through proper design of the ventilation system, which have to be carried out in the detailed design stage. |
| 9.5 | *S.4.3.1, P.5/7*<br>Background noise monitoring for construction noise and traffic noise assessment is not required. | Noted. |
| 9.6 | *S.5.1.9, P.5/7*<br>The existing high background noise level should <u>not</u> be considered as a "mitigation measure" for construction noise exceedance at NSR (CN11). Practical and effective noise mitigation measures to reduce the noise exceedance should be recommended in the report. | Background noise was never considered as a mitigation measure and it is not clear from where in the report this quotation was taken. Rather, it is the consultant's view that background noise is a relevant factor directly affecting NSR CN11 and that this should be taken into account to provide an appropriate context to the findings. Practical mitigation measures had been recommended in the report. |
| 9.7 | *S.5..1.12, P.5/8*<br>As noise exceedances are noted from Table 5.11, practical and effective noise mitigation measures (eg: use of silenced PME) to reduce the noise exceedance should be recommended. | This has already been recommended in paragraph 5.1.13. |
| 9.8 | *S5.2, P.5/9*<br>A drawing (in 1:1000 scale) showing the locations, elevations in mPD and all relevant information of the proposed and existing roads and all the representative existing and planned NSRs should be provided. | Noted and the required maps will be provided |

| Comments Received | | Consultant's Responses |
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| 9.9 | *S.5.2.3, P.5/9* | |
| 9.9.a | Replace "EPD's" using "the" in the first sentence; and | Noted and text will be amended. |
| 9.9.b | The use of friction course has not been demonstrated practical for roads with speed limit lower than 70 km/h. Therefore, we have no objection not to use it as noise mitigation for the present roads. | Noted. |
| 9.10 | *S.5.2.8, P.5/10*<br>the recommendation of increase 5m setback will impose a constraint on the development. Therefore, direct mitigation measure at Road D1 should be explored as far as practicable. | Noted. Additional direct mitigation measures at Road D1 are being considered and the assessment result will be reported in the Final EIA Report. |
| 9.11 | *S.5.2.9, P5/10*<br>Similar to paragraph 10 above, you should explore to increase the height of the soil berm/barrier as far as practicable before studying other mitigation measures on the residential development. | Noted. A soil berm of 9m height was predicted to provide sufficient noise mitigation to meet the HKPSG noise standard. The practicability of the proposed soil berm will be studied and reported in the Final EIA Report. |
| 9.12 | *S.5.2.12, P.5/11*<br>Explain why the proposed barrier cannot be built closer to Hoi On Road to maximise the screening effect. | Noise barriers closer to Hoi On Road are being considered to maximize the screening effect. This will be reported in the Final EIA Report. |
| 9.13 | *S.5.2.13, P.5/11*<br>Cost is not a factor to be considered for recommendation of mitigation measures in the EIA study. Therefore, noise barriers should be recommended on the new ramps unless you can demonstrate that they are ineffective in protecting the residential blocks adjacent to Hoi Hing Road and Tsuen Wan Road. | Noted. Effectiveness of noise barriers on the new ramps to protect the residential blocks adjacent to Hoi Hing Road and Tsuen Wan Road is being reviewed and recommendations will be reported in the Final EIA Report. |

| | Comments Received | Consultant's Responses |
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| 9.14 | Again, you should explore direct mitigation measures before considering indirect technical remedies. To this end, you should study effect of other direct mitigation measures such as enclosures, semi-enclosures and top-bend barrier on Road D2 and D3 to protect the residential blocks adjacent to the roads. | Noted. Additional direct mitigation measures on Road D2 and D3 are being considered to protect the residential blocks adjacent to these roads. The assessment result will be reported in the Final EIA Report. |
| 9.15 | *S.5.2.16, P.5/12*<br>Refer the comments on S.5.12. | Noted. Effectiveness of mitigation measures on new ramps are being reviewed and will be reported in the Final EIA Report. |
| 9.16 | *S.5.2.19, P.5/12 and Table 5.14, P.5/13* | |
| 9.16.a | Explain why the figures in Table 5.14 are different from those in Table A3.5 in the Appendix; and | Noted. Table A3.5 in the Appendix was superseded and will be updated in the Final EIA Report. The latest figures are consistent with Table 5.14. |
| 9.16.b | As shown in Table A3.5, the noise levels at facade S1, S4. S6, S14, S15, S16 and S19 exceed the HKPSG standard and the maximum noise level is up to 71.9 dB(A) at facade S14. Mitigation measures should thus be recommended to reduce the traffic noise at these facades. | Noted. Table A3.5 in the Appendix was superseded and will be updated in the Final EIA Report. The updated noise levels at facade S1, S4, S6, S15 and S16 do not exceed the HKPSG noise standard of 65 dB(A), and hence mitigation measures are not required to protect these facades. |
| 9.17 | *S.5.2.21, P.5/13*<br>Justify why it is ineffective to reduce the noise levels at facade S12 by increasing the height of barrier higher than 3m. | Noted. Effectiveness of barrier higher than 3m is being assessed and will be reported in the Final EIA Report. |
| 9.18 | Since the traffic noise predictions were based on traffic data for the year 2011, we reserve further comments on operational phase impacts until the comments in paragraph 2 above is resolved. | Please refer to response for item 9.2. |
| 9.19 | Estimation on the number of affected dwellings and classrooms before and after the incorporation of mitigation measures should be provided. | Noted. Estimation on the number of affected dwellings and classrooms before and after the incorporation of mitigation measures will be provided in the Final EIA Report. |

| | Comments Received | Consultant's Responses |
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| 10 | Environmental Protection Department<br>Date : 3-11-97<br>Ref. ( ) in EP2/N2/32 (Pt. 14) | |
| 10.1 | With reference to the telephone conversation between your Mr K M Lau and us regarding the CPLD consultation of the above project, please be aware that the draft EIA final assessment report should be endorsed by the Environmental Study Management Group (ESMG) about a month prior to the CPLD consultation. Before the endorsement to take place, all response to comments should be acceptable by all ESMG members and no outstanding controversial issues. In addition, at least a week should be allowed for ESMG members to review any responses to comments. | Noted. The draft EIA final assessment report was endorsed by the ESMG meeting on 26/11/1997. |
| 10.2 | With the condition in the above paragraph and to facilitate the CPLD consultation, we suggest the following schedule as an example for you or your Consultants to prepare a specific one for the captioned project after the adjustment on the date of CPLD consultation and submit to us within this week:<br><br>Date — Events<br>1 December 1997 Consultants' response to comments should be accepted by all ESMG members and no outstanding controversial issues remained.<br>8 December 1997 ESMG to endorse draft final EIA report.<br>9 December 1997 EPD to clear the EIA section of CPLD paper.<br>15 December 1997 TDD to submit the CPLD paper for consultation.<br>30 December 1997 CPLD consultation. | ditto. The proposed dates were superseded by events. |
| 10.3 | Further to the telephone conversation with your Consultants, Mr Anthony Lee of CES last Monday, the land contamination issue is missing in the above report. Since this issue is specified in the study brief, Mr Lee has been advised to insert the land contamination assessment within the section of Solid Waste and Mud Contamination Assessment. As discussed in last Monday, a copy of land contamination assessment for our early review (attention to Mr W Y Kwan (fax : 2318 1877; 2755 1827) and copied to the undersigned) was recommended. | As mentioned in the telephone conversation, land contamination is not a key issue to the study. Text will be provided in the final assessment report to cover the item. |

| | Comments Received | Consultant's Responses |
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| 10.4 | The out-standing comments on Water Quality Assessment are as follows. If you have any queries regarding the following comments, please contact Mr Wallace Yiu (fax : 2591 0542; tel : 2835 1292): | |
| | (a) The proposed discharge locations and the apportionment of sewage discharged at these locations from the development should be indicated in the report. It is recommended that the sewage flows from planning areas 101 and 102 be discharged to the sewer in Castle Peak Road at Belvedere Garden and areas 103, 104 and 105 to sewer at Tai Chung Road. | The proposed sewage system has been looked at and presented in the Investigation Draft Final Report, Section 10.2.2 - Proposed Sewerage System |
| | (b) The consultant should clarify whether a plot ratio of 5 to be used for R1 development is appropriate. There is a significant different between the quantities of sewage discharge from R1 and R2 developments. | Planning Department and Housing Department have made no comment on a plot ratio of 5 for R1 development. |
| | (c) The consultant should clarify that in Table 2.7, the cumulative population built-up for area 101/102 should be 22,232 instead of 21,232 and the area for R1 development should be 103. | Noted and will be amended. |
| | (d) A separate section should be reserved for discussing the sewerage system of the development instead of the brief description in the four paragraphs 7.2.6 - 7.2.9. | See response to item 10.4(a). |
| 10.5 | With reference to CES's letter of reference B010/wp/fhw71024.01 dated 24 October 1997 enclosing the qualitative assessment on odour from dredging, we have no comment on this assessment. | Noted. |

| | Comments Received | Consultant's Responses |
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| 11 | Environmental Protection Department<br>Date :11-11-97<br>Ref: (10) in EP2/N2/32 (Pt.14) Annex A | |
| 11.1 | Risk Assessment | |
| 11.1a | Comment 2.4.c<br>Transient population in open spaces/parks needs to be agreed and QRA reworked with this additional population. EPD does not have this population data. CES/RPA will have to get data from the project team/or propose some working assumption to be agreed with us before reworking the QRA. | The "background" figures of 50 and 20/ha by day and night respectively as discussed and presented in 3.9.20 and Table 3.13 represent the average number of people not otherwise accounted for. These include road users and users of open space such as park, seafront area etc. Therefore, population using the open space has been taken into account in the risk calculation. It is accepted that, on occasion, there will be greater numbers but equally, on other occasions, there will be fewer. Given that risks are measured in terms of the risk over a year, the occasional festival will not be significant factor. |
| 11.1b | Comment 2.4.b, i,k<br>The response on the assessment of societal risk within YKT WTW Consultation Zone (CZ) is unhelpful. RPA are well aware that we require a statement on the increase to overall YKT societal risk caused by the new population intake at Area 35 (is the % increase in societal risk significant?). We are not asking for a re-calculation of societal risks for YKT CZ population. This information can be taken from Atkins 1990 HA report for YKT. | The calculation of % increase in societal risk based on results from Atkins 1990 HA report for YKT is being conducted. The statement on increase to overall YKT societal risk will be given in the final HA report. |
| 11.1c | Comments 2.4.b,c,d,e,g,i,j,k<br>The consultant's response to these comments indicate major revisions to the text. We will need to review and comment on new text, and maybe go through a further iteration. | The report will be revised according to the comments and responses. |

| | Comments Received | Consultant's Responses |
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| 11.2 | Water Quality | |
| 11.2a | Comment 2.7e, P.12<br>We have no difficulty with the recommendation of conducting dredging and filling works in dry season. However, the overall impacts during dry season are not known as the impacts on the nearby sensitive receivers during dry season neap tide had not modelled. Mitigation measures such as silt screen for nearby seawater intakes will, therefore, still be required. Such requirements should be clearly specified in the text. | Mitigation measures will be specified for both dry and wet seasons in the Final EIA Report. |
| 11.3 | Noise | |
| 11.3a | Comment 13.7, P.20<br>We actually request for the <u>mitigated</u> noise levels from the construction activities at the identified noise sensitive receivers after the incorporation of the recommended mitigation measures. | Mitigated noise levels resulting from the use of quieter plant will be presented where possible in those areas where exceedances have been predicted. This will be given in the Final EIA Report. |
| 12 | Environmental Protection Department<br>Date: 18-11-1997<br><u>Ref: ( ) in EP2/N2/32 (Pt. 14)</u> | |
| 12.1 | Thank you for the advanced copy of the Executive Summary. | Noted. |
| 12.2 | Further to our memo under the same reference dated 11 November 1997 and our telephone conversation yesterday, the comments on your initial land contamination assessment are as follows. If you have any queries, please contact our Mr Michael Ching (tel: 2594 6161; fax: 2318 1877). | |
| 12.2a | The Consultant should provide a desktop study/preliminary investigation on the land contamination issues including but not limited to the following items: | Noted. Text has been added accordingly in the revised text submitted on 21/11/97. |
| 12.2ai | Present use of the land including description of the activities, inventory of chemicals hazardous substances handled with clear indication of their storage and location by reference to a site map; | |

| | Comments Received | Consultant's Responses |
|---|---|---|
| 12.2aii | The relevant land history in relation to possible land contamination including incidents (eg. Oil leakage), change of land use and other relevant information; and | |
| 12.2aiii | visual inspection. | |
| 12.2b | Only if contamination is suspected, this will be a key issue to be addressed in subsequent stages of the study and the submission of Contamination Assessment Plan, Contamination Assessment Report and Remediation Action Plan should then follow as part of the study. | Noted. |
| 12.3 | With reference to the EIA study brief, your responses (ref: B010/wp/fal711111.01) dated 11 November 1997 to comment 19.4 (a) is not appropriate. Please note that the findings and recommendations of the proposed sewage system in the Investigation Draft Final Report should be summarised and presented in the Water Quality section of the captioned report. | Noted. Text has been added accordingly in the revised text submitted on 21/11/97. |
| 12.4 | For the risk assessment, the responses are generally acceptable, but we need to review the revised text. The Consultants are advised to submit the revised report for our review and comment/endorsement within the following two days. | Revised text has already been submitted on 20/11/97. |
| 12.5 | In addition, we would draw your attention to our comments on the Inception Report (please refer to EPD's letter of ref: (31) in EP2/N2/32 II dated 20.7.95) regarding the requirements of CCPHI submission and DB papers on the potential risk issue for CCPHI's consideration and DB consultation in the later stage, but not to delay the endorsement of the captioned report for CPLD consultation in 11 December 1997. If you have any queries on the stand-alone Hazard Assessment report, please contact Mr K Y Wong at 2594 6319 or Mr John Wrigley at 2594 6304. | Noted. |
| 12.6 | Please note that the revised pages for paragraphs 2-4 above should be submitted with all the other to ESMG members on or before 21 November 1997 in accordance with paragraph 3 of our yesterday's memo. Grateful if an advance set of revised pages can be faxed to EPD for early review. | Noted. The revised text has been submitted on 21/11/97. |

| | Comments Received | Consultant's Responses |
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| 13 | Environmental Protection Department<br>Date: 20-11-1997<br>Ref: ( ) in EP2/N2/32 (Pt. 14) | |
| 13.1 | Further to our memo today, the out-standing comments on the captioned report have been discussed between you and our specialist groups and listed as follows for your text amendments: | |
| 13.1a | Water Quality | |
| 13.1ai | Sealed grab should be used to place the contaminated mud in a control manner to minimise the release of SS, hence contaminants; and | Noted. Text has been added accordingly in the revised text submitted on 21/11/97. |
| 13.1aii | Add a sub-section to address the concern on possible release of heavy metal during dredging and dumping. | Noted. Text has been added accordingly in the revised text submitted on 21/11/97. |
| 13.1b | Land Contamination | |
| 13.1bi | A sub-section under Solid Waste and Mud Contamination Assessment is necessary under the Study Brief of describe the history, conduct site inspection and consult Marine Department on any past spillage record of the Public Works Cargo Area. | Noted. Text has been added accordingly in the revised text submitted on 21/11/97. |
| 13.1c | Risk | |
| 13.1ci | The Risk Assessment section should be amended in accordance with the guidance and information provided by Mr John Wrigley. A stand-alone Hazard Assessment report should be submitted for CCPHI consultation after the report endorsement. | Noted. Text has been added accordingly in the revised text submitted on 21/11/97. |
| 13.1d | Sewerage | |
| 13.1di | The findings and recommendations of the proposed sewage system in the Investigation Draft Final Report should be summarised and presented in the Water Quality section. Please contact our Mr David Tang (tel: 2935 1090) for guidance. | Noted. Text has been added accordingly in the revised text submitted on 21/11/97. |

| | Comments Received | Consultant's Responses |
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| 13.1e | Noise | |
| 13.1ei | The required noise mitigation measures (including type of mitigations, locations dimensions, number of flats if indirect remedies are necessary and the responsible parties for construction and maintenance) should be clearly reported. Further guidance will be given to you in tomorrow's meeting with our Dr K K Lau (tel: 2594 6551)/Mr Alfred Lo (tel: 2594 6573). | Noted. Noise mitigation measures are being refined and will be reported clearly once available. |
| 13.2 | We have no further comment on air quality and solid waste issues. | Noted. |
| 13.3 | Please note that an advance copy of the revised text to our speciality groups and copy to the undersigned for early review on or before 20 November 1997 is required. The further responses to comments and revised text should be submitted to all ESMG members on or before 24 November 1997 (a.m.) | The revised text has been submitted on 21/11/97. |
| 14 | Environmental Protection Department<br>Date: 17-2-98<br>Ref: EP2/N2/34 (Pt. 14) | |
| 14.1 | P.5/16, S.5.2.31<br>Please amend the last sentence to read as "However, as the dominant noise source would be from existing roads, none of the dwellings would meet the eligibility criteria for indirect technical remedies." | The text has been revised accordingly. |
| 14.2 | P 5/17, S.5.2.32<br>Please replace "noise contribution exceeding 1.0 dB(A)" by "significant noise contribution" in the last sentence. | The text has been revised accordingly. |
| 14.3 | P 5/17, S.5.2.33<br>Please delete "ExCo" before " eligibility criteria" in the last sentence. | The text has been revised accordingly. |

| | Comments Received | Consultant's Responses |
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| 14.4 | <u>P 5/17, S.5.2.34</u><br>Please delete the last 2 sentences of this para. | The text has been revised accordingly. |
| 15 | Fire Services Department<br>Date : 3-3-97<br><u>Ref: (6) in FSD 2/790/78 VI</u> | |
| 15.1 | With reference to memo ref. (93) in NTW 2/299CI/3 Pt.12 dated 3.2.97 from PM(NTW) and the Draft Final Report in respect of the captioned study. | |
| 15.2 | As indicated at section 5.1.3 of the subject report, a new road network strategy incorporating a rear By-pass (either elevated or in runnel) is recommended to be constructed for this project. In order to ensuring that F.S. operations can be maintained subsequent to this provision, the following F.S. requirements and area of concern should be taken into account during detailed design stage: | Noted. The F.S. requirements will be highlighted in the Investigation Final Report for incorporation into the detailed design. |
| 15.2.a | *Tunnel Effect*<br>As a fire protection measure, essential fire services installations and equipment requirements as per Appendix I should be imposed upon a tunnel or similar design exceeding 230m in length. | Noted. See responses to Item 15.2. |
| 15.2.b | *Fire Services Radio Facility*<br>To maintain FSD operational radio communication with our Fire Services Communication Centre inside the "Tunnel" in the discharge of duties, radio facilities for FSD shall be provided therein. Detailed requirements are attached at Appendix II for reference. | Noted. See responses to item 15.2. |
| 15.2.c | *Provision of Fire Hydrant*<br>Stand street fire hydrants are required to be provided at 100m intervals and staggered on both sides of each carriageway/elevated road/tunnel. Exact location of this provision will be assessed in a later stage. | Noted. See responses to item 15.2. |

| | Comments Received | Consultant's Responses |
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| 16. | Fire Services Department<br>Date : 14-10-97<br>Ref: (22) in FSD 2/790/78 VI | |
| 16.1 | Reference is made PM/NTW's memo ref. (19) in NTW 2/299 CL/3 Pt. 14 dated 4.9.97 addressed to me among others. | |
| 16.2 | Since the tunnel bypass option at the rear of the reclamation site was recommended for further study and investigation, my previous comments as contained in letter ref. (6) in this series dated 3.3.97 (copy attached) in respect of tunnel fire safety measures should be observed. In addition, as mitigation measures including noise barrier will also be considered to mitigate noise impact, specific attention and precautionary measures should be taken into account and should under no circumstances cause any obstruction to the emergency vehicular access for the exiting and the proposed buildings/structures in the vicinity. In this connection, due Fire Services advice will be given upon receipt of detailed design. | Noted. See responses to item 15.2. |
| 16.3 | Apart from the above, should any tunnel construction works involving any compressed air atmosphere, please notify this office at your earliest convenience so that FSD Special Task Force equipped with associated equipment and facilities suitable for use under pressurized environment could be set up in time (the lead time will be at least one year for setting up such FSD Special Task Force) before the start of any construction works to enable FSD personnel to deal with any fire or special service incidents inside the tunnel during the construction period. In this respect, please also be advised that all financial implications involving procurement for associated equipment and facilities as well as relevant related costs should be borne by the project. This department will not be responsible for such financial implications. | Noted. See responses to item 15.2. |
| 17 | Highways Department (District & Maintenance)<br>Date: 20 November 1997<br>Ref: ( ) in HNT 713/TW/24 V | |
| 17.1 | I refer to your above quoted facsimile dated 19.11.1997. | |

| | Comments Received | Consultant's Responses |
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| 17.2 | Please note that the Draft Final EIA Report for the captioned reclamation project was only received by this office on 19.11.1997 from our Landscape Unit. | Noted. |
| 17.3 | I have the following comments on the Draft Final EIA Report: | |
| 17.4 | Para. 3.3.5 | |
| | For newly-zoned NSRs exposed to noise from new roads, the mitigation measures should be provided within the sites of NSRs as far as practicable. Unless you could justify that mitigation measures on roadside could mitigate the traffic noise more effectively, you should not use roadside barrier. | Alternatives for noise mitigation measures are being considered based on the discussion on 24/11/97 between the Highways Department, Housing Department and the Consultants and the subsequent discussions with EPD. Results of the assessment will be submitted to these parties before the ESMG meeting. |
| 17.5 | Para. 5.2. Operational Phase Impacts | |
| 17.5 a | I have <u>**strong objection**</u> to the use of soil berm as noise mitigation measure. Please note first of all that it is not a common practice to provide soil berm as noise barrier. Furthermore, for a soil berm of 3m in height, the base width of the berm will be more than 7m. Please clarify whether the roads can accommodate the proposed soil berms. Please send to this office some cross sectional views showing the proposed soil berms for further comment. | Use of soil berm have been minimised in the alternative mitigation measures under consideration. |
| 17.5 b | Maintenance is another problem on the use of soil berm as noise barrier. Adequate surface protection is required to be provided on the soil berm. Such surface protection should be environmental friendly and maintenance free. Please clarify whether you have consider these factors in your proposal. | see response to item 17.5 a. |
| 17.5 c | The proposed soil berm may also affect the sightline of road users and the access for emergency vehicles. Please road users and the access for emergency vehicles. Please clarify whether you have take these factors into account. | see response to item 17.5 a. |

| | Comments Received | Consultant's Responses |
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| 17.5 d | Moreover, the proposed soil berms along roads will restrict any future road widening, such as for layby and busbay construction. Space for underground utility installation will also be reduced due to the soil berm proposal. | see response to item 17.5 a. |
| 17.5 e | I also have **strong reservation** on your proposal of installing barriers on the roadside. Please note that you should always consider providing noise mitigation measure within the new residential/school development sites instead of on the roadside. Roadside noise barriers could only be effective for lower floors of the adjacent buildings. Barriers installed on the podium of the buildings would usually have the same effect as roadside noise barriers. | Alternatives like boundary wall are under consideration. Results of the assessment will be submitted to those relevant parties before the ESMG meeting. |
| 17.5 f | You should always consider using cantilevered barrier set atop building podia of new development sites (as mentioned in para. 5.2.2 of your report) instead of using roadside barriers. Please note again that barriers on roadside will restrict future road widening and have maintenance problems. | Alternatives are under consideration. Results of the assessment will be submitted to those relevant parties before the ESMG meeting. |
| 17.5 g | Figure 5.6<br>You should provide a name for all the proposed barriers and mention the uses of these barriers in the sub-paragraphs of para. 5.2. The length of the barriers should be specified. Please also indicate clearly the road name on figure 5.6. | Noted. |
| 17.3bviii | Para. 5.2.26<br>You should seek comment from the Structures Division of this Department on the proposed noise barriers on ramp structures. | Noted. |
| 18 | Highways Department (Landscape Unit)<br>Date: 11-11-1997<br>Ref: ( )HTDT 12/13/17 | |
| 18.1 | I have no comment on the above report. | Noted. |

| | Comments Received | Consultant's Responses |
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| 19 | Highways Department (RDO)<br>Date : 18-9-97<br>Ref: ( ) in RD 7/3/2 Pt.5 | |
| 19.1 | I have no comment. | Noted. |
| 20 | Housing Authority<br>Date : 15-10-97<br>Ref: HD(P) 7.2.TW1/1 VII | |
| 20.1 | My comments on the Draft EIA Final Assessment Report are as follows: | |
| 20.2 | Areas 102 and 104 will be affected by the traffic noise from Hoi Hing Road and Tsuen Wan Road. The provision of direct mitigation measures at source should be explored as far as possible. The use indirect mitigation measures would pose significant constraints on the development potential of the sites. | Noted. Since there is no current policy to apply retro-active mitigation to existing roads, direct mitigation measures at existing Hoi Hing Road and Tsuen Wan Road have not been considered. Additional mitigation measures are being considered on new ramps of Tsuen Wan Road to maximize noise protection at residential blocks adjacent to Hoi Hing Road and Tsuen Wan Road. The assessment result will be reported in the Final EIA report. |
| 20.3 | The use of friction course should be considered for Tsuen Wan Road. | Noted. The use of friction course has not been considered for Tsuen Wan Road since there is no current policy to apply retro-active mitigation to existing roads. |

| | Comments Received | Consultant's Responses |
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| 21 | Housing Authority<br>Date: 24-11-1997<br>Ref: HD(P) 7/2/TW1/1 | |
| 21.1 | I refer to our discussion with Mr Kenneth Li (HD) and Dr. Tso (CES) in this morning regarding the proposed mitigation for anticipated noise impact. As requested you will take the following proposals into consideration as alternative assessment scenario in the study and to examine their feasibility: | The listed alternative proposal for noise mitigation measures are being tested. Results will be submitted to related parties before the ESMG meeting. |
| 21.2 | For Area 104 (proposed public housing development), use the 3m high noise barrier with cantilever to replace the 9m noise barrier at the northern boundary of the site, and | see item 21.1 |
| 21.3 | For Area 102 (proposed PSPS development), it is my understanding that window orientation of units facing Hoi On Road will be modified, and hence, the 9m high noise barrier along the northern boundary of the site would bot be necessary. | see item 21.1 |
| 21.4 | For Area 101 (proposed PSPS development), a noise barrier with cantilever could be built at the podium edge facing Hoi On Road to substitute the 9m high noise barrier along Hoi On Road. The proposed cantilever should be as low as possible to minimize visual impact to the residents; and | see item 21.1 |
| 21.5 | The consultants will also examine the feasibility of installing air-conditioning to Area 101 & 102 as a last resort. | see item 21.1 |
| 21.6 | Grateful if you could sent the assessment results to us prior to Wednesday's meeting. | see item 21.1 |
| 21.7 | Please fee free to contact Mr. Kenneth Li or the undersigned if you have enquiries. | Noted. |

| | Comments Received | Consultant's Responses |
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| 22 | Kowloon-Canton Railway Corporation<br>Date : 28-10-97<br>Ref. WRMS-001577 | |
| 22.1 | Paragraph 3.6.10 - it is stated that modelling was done for stack emissions within a 1.5km radius of the site, with a total number of 76 chimney sources. However, recent chimney data from EPD indicates that there are more than 200 potential sources in this area. Realistically, to fully cover the site area, the eastern limit x-co-ordinate should be about 830 500, not 830 238 and the southern y-co-ordinate limit should be 824 200, not 824 954. Furthermore, all chimneys in the data set must be modelled if a comprehensive evaluation is to be performed. | It is considered that our assessment based on stack emissions within 1.5 km radius of the site gave comprehensive prediction on air quality impacts. Nevertheless, in order to ascertain our point of view, assessment was done for stack emissions within a 2km radius of the site. The total number of chimneys was about 200 but only 167 chimneys with $SO_2$ emissions. ISCST modelling with 167 chimney sources was undertaken and showed that there is only minor increase in $SO_2$ concentrations (about 1-5$\mu gm^3$) at sensitive receptors for predicted maximum 24 hr and annual average results. There is no change in predicted maximum 1-hr average $SO_2$ concentrations since the additional chimney sources were located at more than 1.5km away from the site and not in the same direction as these chimneys with the highest impacts on the sensitive receivers. |
| 22.2 | Paragraph 3.6.13 - it is stated meteorological data, including wind speed, from Ching Pak House (Tsing Yi) was utilized in the modelling. Information from the Hong Kong Observatory indicates that the elevation of the anemometer at Ching Pa House is 136 mPD. However, inspection of Table B.3.2 - Sample ISCST2 Output File indicates that the height above ground which the wind speed was measured is 17.70 meters. Perhaps some clarification on why this elevation was utilized can be obtained. | The height for Ching Pak House (Tsing Yi) station is 136 mPD but the wind measurement height is the height of the anemometer above local ground level at about 65m. The model is re-run with an anemometer height at 65 m above local ground. The revised ISCST modelling results showed a 10-30% increase in predicted $SO_2$ concentrations at the sensitive receivers. The revised results will be incorporated in the final report. |
| 22.3 | Table B.3.2. - Sample ISCST2 Output File - it is also noted that the ground elevation of all the source chimneys utilized in the model is 0 meters. The source elevations should be adjusted to represent the ground level elevation given that the EPD gives chimney heights which are "above ground" not mPD. | The sensitive receivers and the chimneys are all located on terrains with no more than 5m elevation difference. Therefore it is reasonable to assume that the dispersion over the study area would not be much different, if any, from the dispersion over flat terrain as assumed in our models. |

| | Comments Received | Consultant's Responses |
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| 22.4 | Each of the items listed above will likely directly impact the results of the ISCST2 modelling. Modelling work carried out by KCRC consultants has suggested elevated levels of sulphur dioxide in this area which could potentially affect the proposed residential development with Tsuen Wan Bay Further Reclamation. | In view of the above, it is considered that our predictions based on the revised anemometer height are comprehensive and reasonable. |
| 22.5 | In addition, sections 7.1.7 and 8.3.7. state that dredged materials including Class C contaminated materials will be "dumped and reused on site". | |
| 22.6 | We request that all information relevant to the Geotechnical engineering aspects (commentary on handling and procedures to contain the contaminants, volume of contaminants with a breakdown by class, engineering drawings, etc.) And the environmental acceptability of this proposal including Government comments (EPD, CED, etc.) And agreements are provided to KCRC as no detail is reported in the EIA. | Information had already been provided in Chapter 8 of the report. |
| 23 | Lands Department - District Lands Office, Tsuen Wan<br>Date : 27-9-97<br>Ref: (84) in DLO/TW 5/155/90 V | |
| 23.1 | I have no adverse comments on the EIA report. However, I note from para. 2.8.2 of the report that it is recommended to rezone the T site south of Hoi Hing Road to an 'OU' site. This would affect our land sale programme of the affected T site. I should therefore be grateful it you would keep me informed of the progress. | Noted. |
| 24 | Lands Department - District Lands Office, Tsuen Wan<br>Date: 10-11-1997<br>Ref: (90) in DLO/TW 5/155/90 V | |
| 24.1 | I refer to your letter dated 31 October 1997. The Site referred to should actually be the I (Industrial) Site. | Noted. |

| | Comments Received | Consultant's Responses |
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| 25 | Marine Department<br>Date : 15-9-97<br>Ref: (51) in PA/S 909/110/1(9) | |
| 25.1 | My major concern is the possible heavy sediments in vicinity of the reclamation site. Our experience revealed that the depth of water in vicinity of a reclamation site could be significantly reduced after a large scale reclamation. Finally, the seabed had to be dredged inevitably to maintain it's original level for safety of navigation. | Noted. |
| 25.2 | In para. 7.1.1 to 7.1.9 of the report, it introduced the phasing of reclamation and construction activities. And a submerged sea wall will be built to contain sediments. In order to ensure the effectiveness of the sea wall in containing sediments, please ensure that the seabed level off the reclamation site will be measured both during and after the reclamation, for safety of navigation, immediate actions MUST be taken to maintain the original depth of water. | Noted. |
| 26 | Regional Services Department<br>Date : 9-10-97<br>Ref: (21) in RSD 1/HQ 714/78 (7) Pt. VII | |
| 26.1 | I refer to the memo from Project Manager (NT West) dated 4.9.97 regarding the above subject, we have no comments to offer. | Noted. |
| 27 | Transport Department<br>Date : 15-9-97<br>Ref: NR 171/200-58 | |
| 27.1 | Reference is made to PM(NTW)'s memo ref (19) in NTW 2/299CL/3 Pt.14 to me amongst others dated 4 September 1997. | |
| 27.2 | I have no comments on the draft EIA Final Assessment Report. | Noted. |

| | Comments Received | Consultant's Responses |
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| 28 | Water Supplies Department<br>Date : 23-9-97<br>Ref: (2) in WSD 3052/44/80 Pt.10 | |
| 28.1 | The existing salt water intake of our Tsuen Wan Central Salt Water Pumping Station is expected to be relocated by KCRC under the project, "Tsuen Wan Bay Reclamation" before the commencement of Tsuen Wan Bay Further Reclamation. Please advise us on the effect of the captioned reclamation during the construction stage (such as dredging activity) to the water quality near the proposed salt water intake of the reprovisioned Tsuen Wan Central Salt Water Pumping Station. | Dredging impacts have been discussed and addressed in Chapter 7 of the report. |
| 29 | Water Supplies Department<br>Date : 14-10-97<br>Ref: (5) in WSD 3052/44/80 Pt.10 | |
| 29.1 | Further to my comments on the captioned report given in my previous memo of the same series dated 23.9.97, please also advise me on the predicted water quality near the proposed new salt water intake as detailed in the attached table. | The table as listed refers to parameters for which water quality standards are specified for WSD seawater intakes (Table 3.10 of the report). |

<table>
<tr><th></th><th>Comments Received</th><th>Consultant's Responses</th></tr>
<tr><td></td><td>

| | Parameters | Predicted Water Quality: Construction Phase | Predicted Water Quality: Operation Phase |
|---|---|---|---|
| 1. | Colour (HU) | | |
| 2. | Turbidity (F.T.U) | | |
| 3. | Threshold Odour No. | | |
| 4. | Ammoniacal N | | |
| 5. | Suspended Solids | | |
| 6. | Dissolved Oxygen | | |
| 7. | Biochemical Oxygen Demand | | |
| 8. | Synthetic Detergents | | |
| 9. | E.Coli/100ml | | |

Please fill in the blank</td><td>As discussed in the report, during operation stage, all sewage in the area will be diverted to the SSDS Stage I and most of the pollutants in storm drains will be removed due to sewerage improvement works being undertaken. The TWB development will not cause any deterioration to the water quality at WSD's intake, on the contrary, it can be expected that water quality will be improved due to implementation of SSDS and other sewerage improvement works. Based on the above reasons, it was agreed with EPD that water quality modelling was not required for the study.<br><br>During construction stage, the parameter of concern will be suspended solids. Elevation of SS during reclamation has been assessed and discussed in the report. Mitigation measures were also identified and recommended.</td></tr>
<tr><td>30</td><td>Water Supplies Department<br>Date: 7-11-1997<br><u>Ref: (8) in WSD 3052/44/80 Pt. 10</u></td><td></td></tr>
<tr><td>30.1</td><td>We refer to your letter ref. LSL:jt:92395/10.1-0907 dated 31.10.97 regarding the captioned comments & responses.</td><td></td></tr>
<tr><td>30.2</td><td>Please be advised that this office has not received your letter until 4 November 1997. Your responses to our comments are being circulated within our divisions for comment and we would forward to you our substantial reply as soon as possible.</td><td>Noted.</td></tr>
</table>

| | Comments Received | Consultant's Responses |
|---|---|---|
| 31 | Water Supplies Department<br>Date: 24-11-1997<br>Ref: (26) in WSD 3052/44/80 Pt.10 | |
| 31.1 | We refer to your letter ref. LSL:jt:92395/10.1-0907 dated 31.10.97 and have the following comments on the captioned report: | |
| 31.2 | Paragraph 2.8.4<br>It is of prime important that the seawater quality at the intake complies with WSD's Water Quality Objection (WQO) for flushing supply. Any outfall and berthing activity should not be located within 100m of the WSD's seawater intake. In addition, it is important that the normal functions and operation of the Tsuen Wan Central Salt Water Pumping Station should not be affected at all times, including during the stages of construction/dredging and reclamation. | WSD's concern was noted and these have already been taken into account in the assessment. |
| 31.3 | Paragraph 7.1.2, 7.1.3, 7.1.8 & 7.1.9<br>During construction/dredging/reclamation, close monitoring of the seawater quality on daily basis should be conducted by consultants/developers and the results should be faxed to WSD for information. Effective remedial measures should be taken to eliminate the siltation problem arising from reclamation/construction works such that the water quality near the existing intake (before reprovisioning) and the new intake (after reprovisioning) of the Tsuen Wan Central Salt Water Pumping Station can be maintained within WSD's WQO for flushing purpose at all times. | Monitoring will be carried out during the construction phase to ensure that water quality at WSD's seawater intake would not be adversely affected by the reclamation activities. |
| 31.4 | In the first stage of reclamation, a seawall will be constructed along the southern site boundary. This seawall will be very close to the seawater intake point. During construction, the marine activities and dredging will be inevitably within 100m from the intake which should be minimized our point of view. | Mitigation measures will be provided to minimise dredging impacts to the intake during construction of seawall. |

| | Comments Received | Consultant's Responses |
|---|---|---|
| 31.5 | Paragraph 7.1.20 & 7.1.21<br>At WSD's intake point of Tsuen Wan Central Salt Water Pumping Station, the average turbidity recorded for 96/97 is 4.0 NTU. The baseline of adoption the suspended solids concentration of 26 mg/l, and with anticipating the increase of suspended solids of 8 mg/l is not acceptable for our sea water intake as this will cause deterioration of water quality and complaints for our consumers on discolouration of flushing water supply. | The baseline data was obtained from EPD monitoring station in the main Rambler Channel. It is acknowledged that local water quality can be different. The average turbidity recorded in TW Central Salt Water Pumping Station indicated that near the intake, water quality was better than that in the main channel. An average turbidity of 4 NTU would corresponding to around 5 ppm in suspended solids. Therefore, the margin for elevation in SS would be 5 ppm with reference to the target limit and 15 ppm for the tolerable limit. |
| 31.6 | Paragraph 7.1.23 & 7.3.1<br>From Tables 7.3 and 7.4, the predicted maximum increase of suspended solid concentration of 50 mg/l in dry season and 100 mg/l in wet season at Tsuen Wan Central Salt Water Pumping Station intake exceed the WSD's target limit of 10 mg/l and tolerable limit of 20 mg/l which are not acceptable. Effective remedial measures should be recommended to minimize the effects due to dredging/reclamation/construction activities to maintain the suspended solid turbidity within ESD's WQO for flushing, such activities should be slow down or suspended if necessary. | Predicted values were based on worst case scenarios without mitigation measures. Effective remedial measures have been recommended in the report to minimise the effects and to maintain the SS and turbidity within WSD's WQO for flushing. |

**APPENDIX F**

**IMPLEMENTATION SCHEDULE OF MITIGATION MEASURES**

## Table F.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.<br><br>• 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<br><br>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.<br><br>IC(E) to check monitoring results and laboratory testing. |
| Air Quality | | | | | | |
| 2 | EIA Sec 6.3.1<br><br>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;<br>• Use of frequent watering for particularly dusty static construction areas and areas close to air quality sensitive receivers;<br>• 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;<br>• Open stockpiles should be avoided or covered. Where possible, prevent placing dusty material storage piles near air quality sensitive receivers;<br>• Provision of barriers, which may be the temporary noise barrier, between the site and nearby air quality sensitive receivers to act as dust barriers;<br>• Tarpaulin covering of all dusty vehicle loads transported to, from and between site locations;<br>• 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<br>• Provision of wind shield and dust extractor at the loading points and use of water sprinklers at the loading area;<br>• Imposition of speed controls for vehicles on unpaved site roads. Eight kilometres per hour is the recommended limit by EPD;<br>• 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;<br><br>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.<br><br>IC(E) to audit site inspection records and procedures used by ET. |
| 3 | EIA Sec 6.3.4<br><br>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.<br><br>• 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.<br><br>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.<br><br>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<br><br>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.<br>• 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;<br><br>• 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.<br><br>Before operation of the tunnel | TDD responsible for implementation | |
| Noise | | | | | | |
| 6 | EIA Sec 5.1.12 to 5.1.14<br><br>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: (see table below) | During the construction period (2002 - 2006) | The Contractor responsible for implementation.<br><br>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.<br><br>IC(E) to audit site inspection records and procedures used by ET |

| PME Item | No. of Item | Recommended SWL per Item, dB(A) |
|---|---|---|
| <u>PHASE#1 RECLAMATION WORKS</u> | | |
| *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 |
| <u>PHASE#2 VERTICAL BAND DRAIN INSTALLATION: AREA A</u> | | |
| *INSTALLATION RIG* (for installation of vertical band drains) | 2 | 112 |
| <u>PHASE#3 RECLAMATION WORKS</u> | | |
| *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 |

| 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<br>*DUMP TRUCK* (for placement of surcharge in Area A) 2 110<br>*DUMP TRUCK* (for surcharge maintenance period in Area A) 5 110<br>*DERRICK BARGE* (for placement of public dump in Area C) 1 104<br>*DUMP TRUCK* (for placement of public dump in Area C) 1 117<br>*DERRICK BARGE* (for sandfill placement in Area D) 1 104<br>*TUG BOAT* (for sandfill placement in Area D) 2 110<br>*DUMP TRUCK* (for placement of sandfill in Area D) 5 110<br><br>PHASE#5 RECLAMATION WORKS<br>*DUMP TRUCK* (for removal of surcharge in Area A) 5 110<br>*DUMP TRUCK* (for placement of surcharge in Area C) 1 110<br>*INSTALLATION RIG* (for installation of vertical drains in Area D) 1 112<br>*DUMP TRUCK* (for placement of public dump and surcharge fill in Area D) 5 110<br>*INSTALLATION RIG* (for installation of vertical drains in Area E) 2 112<br><br>PHASE#6 RECLAMATION WORKS<br>*DUMP TRUCK* (for surcharge maintenance period in Area C) 1 110<br>*DUMP TRUCK* (for surcharge removal in Area C) 1 110<br>*DUMP TRUCK* (for surcharge maintenance in Area D) 5 110<br>*DUMP TRUCK* (for surcharge removal in Area D) 5 110<br>*DERRICK BARGE* (for placement of public dump and surcharge fill in Area E) 1 104<br>*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).<br><br>**Location** — **EIA Reference**<br>Facade A1-21, Block F, Site 101 — Sec 5.2.8, Figure 5.2<br>Facade A1-9, Block A, Site 101 — Sec 5.2.10, Figure 5.2<br>Facade A2-25, Block A, Site 102 — Sec 5.2.12, Figure 5.3<br>Facade A2-13, Block C, Site 102 — Sec 5.2.13, Figure 5.3<br>Facade A2-15, Block C, Site 102 — Sec 5.2.13, Figure 5.3<br>Facade A2-16, Block C, Site 102 — Sec 5.2.13, Figure 5.3<br>Facade A2-48, Block E, Site 102 — Sec 5.2.14, Figure 5.3 | During detailed design stage | Housing Department responsible for implementation | |

<table>
<tr><th>Item No.</th><th>EIA Ref.</th><th>Activity</th><th>Environmental Protection Measurement</th><th>Timing</th><th>Responsibilities for Implementation</th><th>Audit Method</th></tr>
<tr><td>7<br>cont'd</td><td></td><td>Operational noise (cont'd)</td><td>Set backs from the carriageways should be incorporated into the planning layout of land uses in the area as follows:<br><br><table>
<tr><th><u>Block</u></th><th><u>Major Traffic Noise Contributor</u></th><th><u>Minimum Setback Distance from the carriageways (m)</u></th></tr>
<tr><td colspan="3"><u>Area 101 (PSPS) 2400 Flats</u></td></tr>
<tr><td>A</td><td>Hoi On Road</td><td>46</td></tr>
<tr><td>A</td><td>Road D1</td><td>16</td></tr>
<tr><td>B-E</td><td>Hoi On Road</td><td>85</td></tr>
<tr><td>B-E</td><td>Road L1</td><td>46</td></tr>
<tr><td>F</td><td>Road L1</td><td>12</td></tr>
<tr><td colspan="3"><u>Area 102 (PSPS) 200 Flats</u></td></tr>
<tr><td>A</td><td>Hoi On Road</td><td>44</td></tr>
<tr><td>A</td><td>Road D1</td><td>15</td></tr>
<tr><td>B,C</td><td>Hoi On Road</td><td>93</td></tr>
<tr><td>B,C</td><td>Tsuen Wan Road</td><td>216</td></tr>
<tr><td>D-F</td><td>Hoi Hing Road</td><td>18</td></tr>
<tr><td>D-F</td><td>Tsuen Wan Road</td><td>76</td></tr>
<tr><td>D-F</td><td>Road D2</td><td>15</td></tr>
<tr><td>D-F</td><td>Road D3</td><td>23</td></tr>
<tr><td colspan="3"><u>Area 103 (R1) 3000 Flats</u></td></tr>
<tr><td>All</td><td>Road L1</td><td>18</td></tr>
<tr><td>All</td><td>Road L2</td><td>10</td></tr>
<tr><td>All</td><td>Road D3</td><td>15</td></tr>
<tr><td colspan="3"><u>Area 104 (RS) 3600 Flats</u></td></tr>
<tr><td>A</td><td>Hoi Hing Road</td><td>8</td></tr>
<tr><td>A</td><td>Tsuen Wan Road</td><td>72</td></tr>
<tr><td>A</td><td>Road D2</td><td>22</td></tr>
<tr><td>B</td><td>Road D2</td><td>22</td></tr>
<tr><td>B</td><td>Road D3</td><td>50</td></tr>
<tr><td>B</td><td>Road L2</td><td>6</td></tr>
<tr><td>B</td><td>Roundabout</td><td>10</td></tr>
<tr><td>C-E</td><td>Tsuen Wan Road</td><td>134</td></tr>
<tr><td>C-E</td><td>Road L2</td><td>8</td></tr>
</table></td><td>Before occupation of Sites 101, 102, 103 and 104</td><td><u>Site 103</u><br>Private developer responsible for implementation subject to lease conditions imposed by DLO.<br><br><u>Sites 101, 102, 104</u><br>Housing Department Responsibl e implementation</td><td></td></tr>
</table>

| 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:<br><br>**Location:** NE boundary of the podium, Blocks A and B, Site 101<br>**Distance from the extended podium to the kerb side of Road D1:** 3 m<br>**EIA Reference:** Sec 5.2.9, Figure 5.2<br><br>**Location:** NE, NW & SW boundaries of the podium, Block A, Site 102<br>**Distance from the extended podium to the kerb side of Road D1:** 5 m<br>**Length of the extended podium along Road D1:** 67 m (chainage: 140 to 207 m)<br>**Width of the extended podium from edge facing Road D1:** 62 m<br>**EIA Reference:** Sec 5.2.12, Figure 5.3 | Before occupation of Sites 101 and 102 | **Site 101,102**<br>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:<br><br>**Location** / **Total Length** / **EIA Reference**<br>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:<br><br>**Location** / **Total Length** / **EIA Reference**<br>NW site boundary of Block B, Site 104 (on selected sections of Road D2 & L2) / 105 m / Sec 5.2.21, Figure 5.4<br><br>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<br><br>SE site boundary of secondary school, Site 101 (on selected section of Road L1) / 75 m / Sec 5.2.27, Figure 5.2<br><br>NE site boundary of secondary school, Site 103 (on roundabout of Road D2, L2 & D3) / 75 m / Sec 5.2.27, Figure 5.4<br><br>E site boundary of secondary school, Site 103 (on selected section of Road L2) / 66 m / Sec 5.2.27, Figure 5.4<br><br>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)**<br>Housing Department responsible for implementation<br><br>**School Sites**<br>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:<br><br>**Location 1:** New roads in the southwest of the proposed tunnel<br>Chainage: Northern lane: 5195m to 5244m and 5263m to 5411m<br>Southern lane: 1195m to 1398m,<br>Eastern ramp: 1453m to 1602 m<br>Dimension: 5m tall + 2m overhang<br>EIA Reference: Sec 5.2.31, Figures 5.5, 5.8a, 5.8b<br><br>**Location 2:** New ramp connecting the proposed tunnel and Tsuen Wan Road<br>Chainage: 6462m to 6832 m<br>Dimension: 5m tall + 3m overhang<br>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<br><br>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;<br>• The decks of all vessels should be kept tidy and free of oil or other substances that might be accidentally or otherwise washed overboard;<br>• 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;<br>• 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;<br>• Silt curtains should be in place during dredging and filling works to minimise the dispersion of sediment plume; and<br>• 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;<br>• The maximum dredging rate of marine mud should not exceed 7,500 cu.m per day;<br>• The maximum dumping rate of marine mud should not exceed 7,500 cu.m per day;<br>• The maximum filling rate of the sand blanket on top of the existing seabed should not exceed 4,500 cu.m per day;<br>• 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;<br>• 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.<br><br>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.<br><br>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<br><br>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<br><br>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 7.1 to 7.5 of the EIA report;<br>• 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.<br>• Provision of perimeter channels to intercept storm-runoff from outside the site. These should be constructed in advance of site formation works and earthworks;<br>• 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;<br>• Careful programming of the works to minimise soil excavation works during rainy seasons;<br>• Exposed soil surface should be protected by shotcrete or hydroseeding as soon as possible to reduce the potential of soil erosion;<br>• Temporary access roads should be protected by crushed gravel and exposed slope surfaces should be protected when rainstorms are likely;<br>• Trench excavation should be avoided in the wet season, and if necessary, these should be excavated and backfilled in short sections;<br>• Open stockpiles of construction materials on site should be covered with tarpaulin or similar fabric during rainstorms;<br>• 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<br>• 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;<br><br>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.<br><br>IC(E) to audit site inspection records and procedures used by ET |
| 11. | EIA Sec 7.4.5<br><br>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;<br>• 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;<br>• 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.<br><br>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<br><br>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;<br>• Training of site personnel in proper waste management and chemical handling procedures;<br>• 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;<br>• The reuse and recycling of materials wherever possible;<br>• Provision of sufficient waste disposal points and regular collection for disposal;<br>• Provision of an enclosed transfer facility for storage and containment;<br>• Separation of chemical wastes for special handling and appropriate treatment at the chemical waste treatment facility;<br>• Refuse containers such as open skips should be provided at every work site for use by the workforce;<br>• Human waste should be discharged into septic tanks provided by the Contractors and be removed regularly by a hygiene services company;<br>• Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors;<br>• 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<br>• 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.<br><br>IC(E) to check the ET's audit procedures and results |