

**Environmental Protection Department
Sewerage Infrastructure Planning Group**

**Further Development of Strategic Sewage Disposal Scheme
Stage III/IV**

Project Profile

August 1999

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1.1 Project Title

Strategic Sewage Disposal Scheme (SSDS) Stage III/IV.

1.2 Purpose & Nature of the Project

The whole SSDS Project comprises four stages. Stage I will provide a deep tunnel system to collect sewage from the preliminary treatment works (PTWs) in Kowloon and Hong Kong Island East and transfer it for treatment and disposal at Stonecutters Island Sewage Treatment Works (SCISTW). Construction of the treatment works and interim outfall is complete while construction of the remainder of the scheme is still in progress.

The Stage III/IV, this Project, aims to collect sewage from PTWs in Hong Kong Island and transfer it for treatment and disposal at SCISTW in order to meet the Water Quality Objectives (WQOs) within the Victoria Harbour Water Control Zone (VHWCZ). This Project involves the upgrading of existing PTWs at North Point, Wan Chai East, Wan Chai West, Central, Sandy Bay and Aberdeen; the construction of pumping stations at Shau Kei Wan, Aberdeen, Sandy Bay and Ap Lei Chau; the construction of a transfer system (tunnels and pipelines) to convey screened sewage from the PTWs to SCISTW by using the pumping stations and; expansion of SCISTW to enable treatment of the increased sewage flows.

The Stage II will provide a transfer and pumping system to convey the Stage I and Stage III/IV effluent from the SCISTW to an oceanic outfall east of Lamma as well as disinfection facilities. A feasibility study on this stage is now in progress.

1.3 Name of Project Proponent

The Waste & Water Division of the Environmental Protection Department (EPD) of the Government of the Hong Kong Special Administrative Region.

1.4 Location and Scale of Project

Figure 1.4.1 illustrates the preferred transfer option developed for the Stage III/IV system.

Table 1.4.1 describes the key components of the SSDS Stage III/IV transfer system including tunnel and pipeline diameters and pumping station requirements. Capacities of preliminary treatment plants and the expanded SCISTW are also shown for reference.

1.5 Numbers and Types of Designated Projects

The pumping stations components at Shau Kei Wan and Sandy Bay in SSDS Stage III/IV are the designated projects as specified under Part I, Category F3 (b) of Schedule 2 of the Environmental Impact Assessment Ordinance - 'SEWAGE COLLECTION, TREATMENT, DISPOSAL and REUSE'. It is because the installed capacities of these pumping stations are proposed between 2,000 to 300,000 m³/day and the pumping stations are constructed with a boundary of less than 150m from the affected area.

Due to the exceeding of the installed capacity which is more than 15,000 m³/day, the PTWs at North Point, Wan Chai West and Aberdeen in Stage III/IV are the designated projects as specified under Part I, Category F1, of Schedule 2 of the EIAO. For the PTW at Sandy Bay, it is classified as in Category F2 (a) & (b) because of the installed capacity is proposed between 5000 to 15000 m³/day and it is constructed with a boundary of less than 200m from the nearest boundary of the affected area.

The transfer system components (including drop shafts) and the other pumping systems as well as the related works in Stage III/IV should be considered in the EIA study. Designated projects items forming the SSDS Stage III/IV are listed in Table 1.5.1.

LEGEND:

- Drop Shaft
- Riser Shaft
- ⊗ Riser / Drop Shaft
- ⇨ Raw Sewage Transfer
- ⇨ Screened / Degrittied Sewage Flow
- (3200) Tunnel / Pipe I.D. in mm

Location	2021 ADMF, m ³ /s	2021 PTF, m ³ /s unless otherwise noted	TPS	Transfer Pumping Station	TPS Capacity
Sandy Bay	0.36	2.28	0.69		

SCISPS = Stonecutters Island Secondary Pumping Station

WORKS UNDER SDDS STAGE III/IV

- Deep Tunnel
- - - Pipeline(s) within Deep Tunnel
- Pipeline within Drill & Blast Tunnel
- Cut & Covered Pipeline
- Horizontal Directional Drilling
- Microtunnelling

WORKS NOT UNDER SDDS STAGE III/IV

- Stage I Tunnel
- Stage I Tunnel to be phased out upon commissioning of Stage III/IV
- PTWs by others
- Tunnel/Pipe by others
- NWK PTW
- NWK PTW Outfall

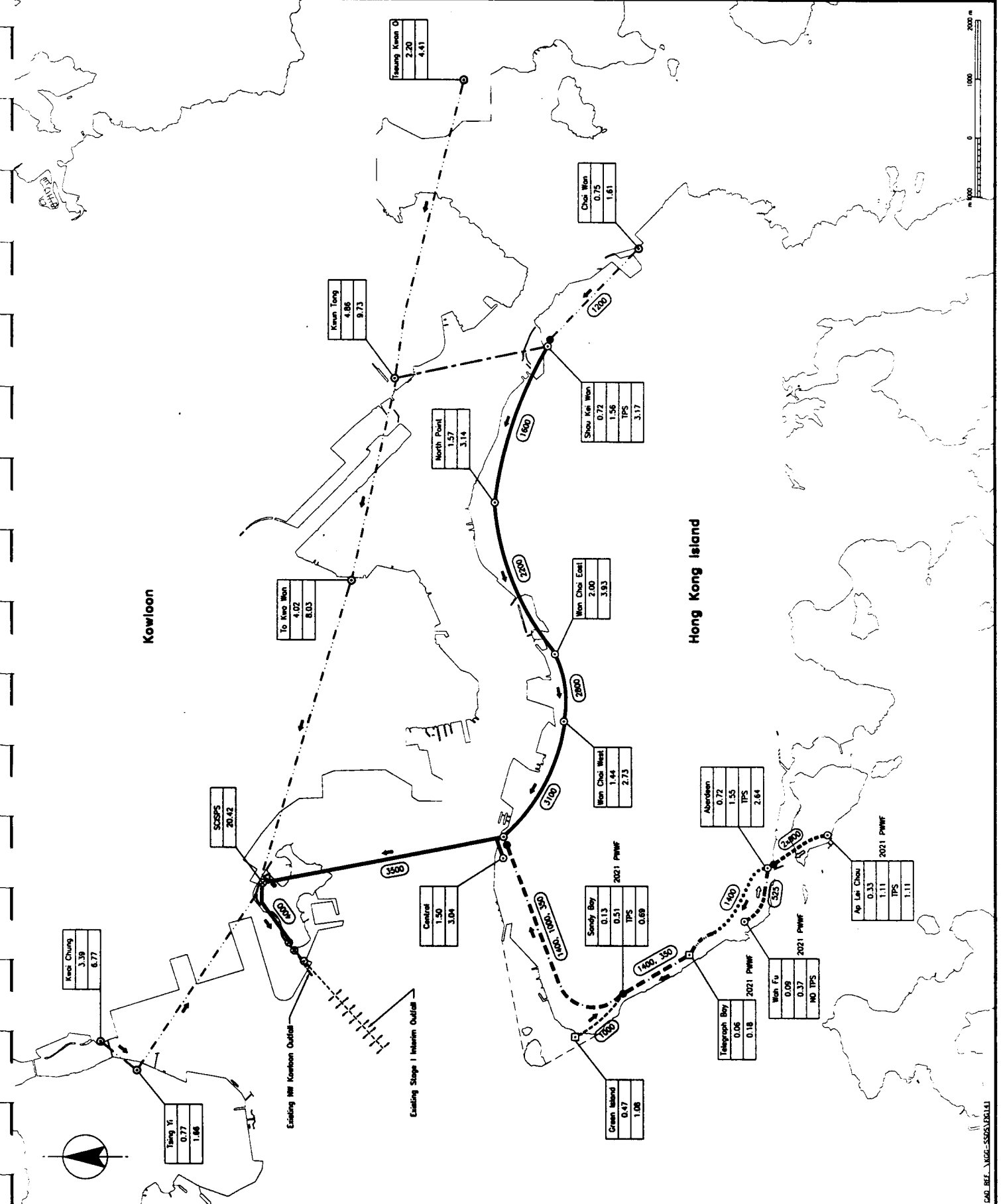
THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION

Agreement No. CE 8/07
Further Development of Strategic Sewage Disposal Scheme Stage III & IV and PPS

STAGE III/IV TRANSFER SYSTEM SCHEMATICS

Figure No. 1.4.1

MONTGOMERY WATSON
 1. a subsidiary of
 Parsons Brinckerhoff
 2. a subsidiary of
 Bechtel Group Ltd
 3. a subsidiary of
 B&W Construction Ltd



Kwai Chung	3.39	6.77
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Tung Yi	0.77	1.86
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SCISPS	20.42
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To Kwo Wan	4.02	8.03
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Kwai Tong	4.86	9.73
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Heung Yuen O	2.20	4.41
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Central	1.50	3.04
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North Point	1.57	3.14
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Choi Wan	0.72	1.44
Shau Kei Wan	0.72	1.56
TPS	3.17	

Sandy Bay	0.13	0.51
TPS	0.69	

Wan Chai East	2.00	3.93
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Wan Chai West	1.44	2.73
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Abandon	0.72	1.44
TPS	2.64	

Telegraph Bay	0.06	0.18
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Wan Fu	0.09	0.37
NO TPS		

Ap Lei Chau	0.33	1.11
TPS	1.11	

2021 PWWF		
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Table 1.4.1
Key Components of Stage III/IV System

Component	Description
Transfer System⁽⁴⁾ <ul style="list-style-type: none"> • HK Island ⇒ SCISTW • Stage III <ul style="list-style-type: none"> Shau Kei Wan ⇒ North Point North Point ⇒ Wan Chai East Wan Chai East ⇒ Wan Chai West Wan Chai West ⇒ Central • Stage IV <ul style="list-style-type: none"> Ap Lei Chau ⇒ Aberdeen⁽¹⁾ Wah Fu ⇒ Aberdeen⁽¹⁾ Aberdeen ⇒ Telegraph Bay (TB) TB ⇒ Sandy Bay (SB)⁽¹⁾ TB ⇒ SB ⇒ Central • Drop shaft at various PTWs 	<ul style="list-style-type: none"> • 3500mm internal diameter (ID) deep tunnel (4.1km) • 1600mm ID pipeline, in 3200mm ID deep tunnel (2.9km) • 2200mm ID deep tunnel (3.0km) • 2800mm ID deep tunnel (1.0km) • 3100mm ID deep tunnel (2.5km) • Twin 800mm ID horizontal directional drilling (HDD) pipeline (1.2km) • 525mm ID sub-surface pipeline (1.0km) • 1400mm ID pipeline within drill & blast (D&B) tunnel and sub-surface trench (1.8km) • 350mm ID sub-surface pipeline (1.3km) • 1400mm ID + 350mm ID pipelines (TB to SB); 1000mm ID + 700mm ID + 1400mm ID pipelines (SB to Central) within 3200mm ID deep tunnel (5.4km) • As shown on Figure 1.4.1
Pumping Stations⁽³⁾ <ul style="list-style-type: none"> • Transfer-type <ul style="list-style-type: none"> Shau Kei Wan Aberdeen Sandy Bay • Local-type <ul style="list-style-type: none"> Ap Lei Chau 	(New pumping stations) <ul style="list-style-type: none"> • 1.47 m³/sec 2021 ADWF (average dry weather flow), (Chai Wan + Shau Kei Wan) • 1.14 m³/sec 2021 ADWF, (Abe+ Ap Lei Chau+ Wah Fu) • 0.19 m³/sec 2021 ADWF, (Telegraph Bay + Sandy Bay) • 0.33 m³/sec 2021 ADWF
Preliminary Treatment Works (PTWs) <ul style="list-style-type: none"> • Stage III <ul style="list-style-type: none"> North Point Wan Chai West • Stage IV <ul style="list-style-type: none"> Aberdeen Sandy Bay (augmentation) 	(Total capacities after upgrading) <ul style="list-style-type: none"> • 1.57 m³/sec 2021 ADWF • 1.44 m³/sec 2021 ADWF • 1.14 m³/sec 2021 ADWF (Abe+ Ap Lei Chau+ Wah Fu) • 0.13 m³/sec 2021 ADWF
SCISTW <ul style="list-style-type: none"> • Plant Expansion 	<ul style="list-style-type: none"> • 59.48 m³/sec required capacity

Note:

1. For raw sewage transfer.
2. Diversion of some flow from Wan Chai East to North Point PTW taken into account.
3. Local pumping stations transfer sewage to the SSDS, transfer pumping stations flow within the SSDS transfer system. In design and operation, local and transfer pumping stations are based on the same design arrangements.
4. Prior to the commissioning of SSDS Stage II, the combined Stage I and Stage III/IV flows will be discharged via the existing Stage I interim and North West Kowloon submarine outfalls.

Table 1.5.1
Designated Projects Covered by Project Profile

Designated Project	Proposed Capacity (2021 ADWF, m ³ /sec) (2021 ADWF, m ³ /day)	Schedule of the EIA Ordinance (Schedule 2, Part 1)	
		Category of Project	Applicable Item
Pumping Stations	(New pumping stations)		
• Transfer-type Shau Kei Wan	• 1.47 m ³ /sec (127008 m ³ /day) (Chai Wan + Shau Kei Wan)	F3	(b) i,ii,iii & vi
Sandy Bay	• 0.69 m ³ /sec (59616 m ³ /day) (Telegraph Bay + Sandy Bay)	F3	(b) iii & iv
Preliminary Treatment Works	(Total capacities after upgrading)		
• Stage III			
North Point	• 1.57 m ³ /sec (135648 m ³ /day)	F1	-
Wan Chai West	• 1.44 m ³ /sec (124416 m ³ /day)	F1	-
• Stage IV			
Aberdeen	• 1.14 m ³ /sec (98496 m ³ /day)	F1	-
Sandy Bay (augmentation)	• 0.13 m ³ /sec (11232 m ³ /day)	F2	(a), (b) i,iii & iv
SCISTW			
• Plant Expansion	• 59.48 m ³ /sec* (5139072 m ³ /day)	F1	-

* denotes combined total flow from SSDS Stage I and Stage III/IV

1.6 Name(s) and Telephone Number(s) of Contact Person(s)

Environmental Protection Department
Montgomery Watson Hong Kong Ltd.

PLANNING AND IMPLEMENTATION PROGRAMME

2.1 Planning & Implementation

The whole project will be planned and implemented by Drainage Service Department with consultants. Construction will be carried out by contractors.

2.2 Project Programme

Apart from the construction of a new PTW at Sandy Bay, the construction of the PTWs, pumping stations and transfer system will be undertaken during Phase I.

The current target dates for subsequent project construction are:

- Detailed Design and Tender

PTWs	June 2000 to July 2002
Tunnels	June 2000 to August 2003
- Site Investigation September 2000 to January 2002
- EIA Study September 2000 to September 2001
- Project Construction

Phase I	January 2002 to May 2008
Phase II (new PTW at Sandy Bay)	complete April 2010.

2.3 Other Projects in the Vicinity of the Study Area

Major projects identified which may occur concurrently with the proposed SSDS Stage III/IV works in the vicinity of the proposed sites are:

- Green Island Reclamation Works;
- Telegraph Bay Development;
- Route 7;
- MTRC Island Line Extension;
- Wan Chai Reclamation Phase II;
- Central Reclamation Phase III;
- Improvement to Island East Corridor Section between North Point Interchange and Sai Wan Ho; and
- Drainage Improvement on Northern Hong Kong Island.

POSSIBLE IMPACT ON THE ENVIRONMENT

3.1 Outline of Process Involved

Potential environmental impacts of SSDS Stage III/IV are associated with construction and operation.

The construction phase of SSDS Stage III/IV works will involve site formation, earthworks, driving of piles, tunnelling by using drill and blast techniques and tunnel boring machine to excavate rock, micro-tunnelling, the excavation of production drop/shaft, PTW and pumping station construction/expansion etc. The following sections consider the likely construction activities taking place and the potential for environmental impacts that may arise. Based upon an initial evaluation as to the local significance of these impacts, the requirement for mitigation can then be determined.

Operational phase impacts are discussed in Section 3.2.2.

3.2 Possible Environmental Impact**3.2.1 *Construction Phase******Air Quality***

The presence of ASRs in the vicinity of most of the works sites in SSDS Stage III/IV indicates that air quality may be impacted by dust emission. Construction activities that have the potential to generate dust include the process of stockpiling of tunnel spoil, excavation works, spoil and waste transfer/transport, construction traffic, general construction and upgrading works. Dust emission would vary substantially from day to day depending on the size of the works site, the level of activities, the specific construction operation and the prevailing climate conditions. Numerous of ASRs in the vicinity of sites are expected to be minimally impacted due to the existing heavy traffic conditions. Appropriate dust mitigation and suppression measures are necessary in order to ensure that impacts are within acceptable limits.

Noise

It has been predicted that unmitigated construction noise impacts associated with the proposed site locations would be high at numerous nearby NSRs because of the construction activities. Particularly noisy activities will include excavation by drill and blasting, piling and foundation works, waste/material and equipment transfer/transport and construction activities on site. Noise impacts are likely to be minimal at some site locations because they are already impacted by the traffic noise at the nearby expressway and cargo handling facilities. The implementation of noise and vibration mitigation measures can maintain the noise within acceptable levels.

Water Quality

Uncontrolled site runoff and temporary by-pass of raw sewage at the PTWs into water courses and marine waters are regarded as the main potential source of water pollution during construction of Stage III/IV. Site runoff may consist of washout water from concrete batching, vehicle wheel and body washing facilities and water contaminated by oil, grease, bentonite slurry, sediments or chemicals used in the finishing processes for buildings. To achieve the “Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters”, runoff should be intercepted and treated prior to discharging off site. All of the PTW upgrading and construction proposals for Stage III/IV have been developed to avoid any sewage bypass as far as possible to the sea. The provision of additional temporary works such as over pumping is also recommended to be included in future contracts to further minimise any need for sewage to by-pass preliminary treatment.

Waste Management

The wastes that are likely to be generated during the SSDS Stage III/IV works include the following:

- waste spoil from site clearance, site preparation, tunnel excavation and earthworks;
- chemical wastes generated via the maintenance of plant and equipment;
- general construction material; and
- general refuse comprising food waste, newspaper and packaging.

The waste spoil and general construction material should be disposed to the public dump. However, discussion with Fill Management Committee and Geotechnical Office is required for disposal of these kind of waste to dumping site. For the chemical wastes and other general refuse, the storage and method of transportation to landfill sites should be undertaken in an appropriate manner to avoid potential nuisances associated with odour and visual impact.

Ecology

Terrestrial ecological impacts will not occur because most of the proposed sites of the SSDS Stage III/IV are located within predominantly urban or urban/industrial settings. However, the EIA study will carry out an investigation of vegetation for land clearance at the proposed sites at Aberdeen and Sandy Bay.

Marine ecological impacts may arise if contaminated runoff discharges from the works site. Standard good site practice and the provision of temporary sewage facilities are recommended in order to protect the marine environment in the vicinity of the works sites.

Landscape and Visual

Construction activities at the proposed works sites are not considered to generate significant visual impacts within areas undergoing development or in industrial/urban setting. Works at Sandy Bay, Telegraph Bay, Wah Fu and Aberdeen will cause visual impact within the site's visual envelope and residents who overlook the site. Screens and high enclosing walls may be used at these locations to shield the sites and reduce adverse impacts.

Cultural Heritage

There are no major cultural heritage sensitive receivers in the immediate vicinity of most proposed works sites. The only historic building in close proximity to a SSDS works site is the Tam Kung Temple at Shau Kei Wan. It should not be disturbed during the construction and operational phase. Nonetheless, vibration during the tunnelling works will be further considered to see the effect on the historic buildings (as in Table 3.2.1) and alike in the vicinity of the proposed works.

Table 3.2.1
Historic Buildings and Structures in Vicinity of SSDS Stage III/IV Works

Building / Structure	Address	Number of Structures
Tam Kung Temple	Shau Kei Wan	1
Historic Structures on Stonecutters	Stonecutters Island	28
Lighthouses and Adjacent Historic Buildings	Green Island	4
Mount Davis Battery (including gun emplacements, Command Headquarters, underground structures and other auxiliary building and structures)	Mount Davis	10
Historic Military Pill Box No. 4	Telegraph Bay	1
Historic structures in Telegraph Bay Village	Telegraph Bay	22

Night-Time Construction

Tunnelling and shafting are the only construction activities taken 24 hours a day in proposed works sites. Construction of tunnel using TBM and drilling and blasting could induce structure-borne noise, which needs to be assessed in the EIA. However, shafting is taken on the ground level. Contractor is required to apply a noise control permit from EPD and abide by the stricter night-time criteria set out in the Noise Control Ordinance.

Traffic Generation

The main extra traffic loading would be generated when vehicles remove excavated spoil.

3.2.2 Operational Phase

Air Quality

Once the Stage III/IV scheme is commissioned, air quality issues will be confined primarily to odour at treatment works and pumping stations. The major odour sources are the sewage, grit, screenings and sludge at all PTWs and pumping stations. Hydrogen sulphide is the main pollutant. De-odorisation will be applied to reduce the odour.

Noise

Operational noise impacts are not considered significant because of the unchanged existing conditions. However, the upgrading of some PTWs will need to be designed to take into account the presence of existing and future NSRs and also necessary to include noise mitigation techniques such as those practiced at existing PTWs.

Water Quality

Water quality impacts exclude the consideration of impacts on the discharge of combined Stage I/III/IV flows through the Stage II long sea outfall. However, prior to the commissioning of Stage II, the combined Stage I/III/IV flows will be discharged via the existing Stage I Interim and North West Kowloon outfall. Although a preliminary water quality assessment undertaken by the Water Policy and Planning Group of EPD indicates that this interim discharge arrangement would be no adverse effects on the water quality, a detailed assessment in the EIA is recommended to address the potential water quality and ecological impacts due to this interim arrangement.

Waste Management

Waste sources during operation will largely take a form of general refuse associated with office, rest and catering activities. Some chemical waste is likely generated from maintenance of all aspects of all PTWs and pumping stations.

Also a large amount of grit and screenings are collected in the preliminary treatment process. They will be washed by grit classifier and washpactor respectively to remove organic content before final disposal to landfill. Disposal of sludge will follow the established procedures for Stage I.

Ecology

Ecological impact is considered insignificant during the operational phase. The purpose of SSDS Stage III/IV is to reduce the amount of sewage effluents entering Victoria Harbour and the East Lamma Channel. Therefore significant marine ecological benefits are predicted in areas where effluents are currently being discharged. The overall ecological impacts of the chemical treated effluent discharging from the SCITW are considered in SSDS Stage II EIA.

Landscape and Visual

No significant visual impact is anticipated in the operation phase. The design of all PTWs and pumping stations will be in keeping with the prevailing visual environment. If adverse visual impacts are apparent these could be mitigated through appropriate landscaping.

Cultural Heritage

During Stage III/IV operation, no significant cultural heritage impacts are anticipated.

Hazardous Materials

The chemical dosing facilities of SCISTW comprise:

- Ferric Chloride
- Polymer (for sedimentation)
- Polymer (for sludge dewatering)

The ferric chloride system is used as an aid in settling primary sludge in the sedimentation tanks. Ferric Chloride is a corrosive chemical. It is delivered in liquid form in bulk by barge or truck tanker. There are six ferric chloride storage tanks. The net volume of each tank is 483m³ with a total net storage volume of 2896m³.

The polymer system is used to make-up polymer solution for use as an aid in settling primary sludge in the sedimentation tanks and sludge dewatering. It is delivered by truck in dry form in bulk shipping containers or pneumatic unloading trucks and transferred into two storage tanks which are located outside the existing sludge dewatering buildings. The existing polymer preparation system is rated for 3250kg polymer/day and it is supplied to the site in powder form in 800kg “big bags”. However, polymer is not considered as hazardous by its physical/chemical properties.

MAJOR ELEMENTS OF THE SURROUNDING ENVIRONMENT

4.1 Existing and Planned Sensitive Receivers**4.1.1 Air Sensitive Receivers (ASRs)**

Numerous ASRs have been identified in the vicinity of all of the proposed works sites under the Technical Memorandum on Environmental Impact Assessment (TMEIA). Figure 4.1.1 - 4.1.12 show the locations of ASRs. The following lists the ASRs in the vicinity of each of works site:

- **Shau Kei Wan**
 - ASKW1: Tam Kung Temple and Shau Kei Wan Primary School;
 - ASKW2: Shau Kei Wan Secondary School, Shau Kei Wan Church, Kam Fat Building, On Lok Building, Shing Chung Building, Hung Yun Building;
 - ASKW3: Tung Bo Building, Tung Wong Building, Tung Shing Building, Tung Hing Building, Tung Yee Building, Tung Keung Building, Pak Ming Building, Kam Loi Building;

- **Quarry Bay**
 - AQUB1: Canossa College, Lai Chi Gardens, Ying Lai Court, Kam Fong Building, Fu King Building, Lai Wah Building, Lai King Building;
 - AQUB2: Hong Kong Funeral Home;
 - AQUB3: Model Housing Estate, Lai Do Building, Lai Shing Building and North Point Comprehensive School;
 - AQUB4: Lung King Building, Bun Hoi Building and Hoi Kwong Court;
 - AQUB5: Harbour View Gardens;

- **North Point**
 - ANP1: Healthy Gardens, Island Place, Full Wealth Gardens, Bedford Gardens, Tanner Gardens, and other residential along Tanner Road;
 - ANP2: Chan Wai Chow Primary, North Point Estate, Harbour Parade, other residential along Java Road, Marble Road and King's Road;
 - ANP3: Po Shek Building, Yee King Building, Healthy Estate, Hoi Chi Court and Model Housing Estate;

- **Wan Chai East**
 - AWCE1: a large numbers of residential receivers located beyond Gloucester Road along Jaffe Road, Lockhart Road and Hennessey Road;
 - AWCE2: Wan Chai Sports Ground;

- **Wan Chai West**
 - AWCW1: Hong Kong Academy for Performing Arts;
 - AWCW2: Servicemen's Guides Association;

- Central
 - ACEN1: a number of residential receivers beyond Connaught Road along Wing Lok Street, Bonham Road, Ko Sing Street, Queen's Road West and De Voeux Road West;

- Sandy Bay
 - ASDB1: Ho Sin Hang Home for the Elderly, Chuk Lam Ming Tong Care and Attention Home, The Duke of Kent Children's Hospital, John F. Kennedy Centre, Margaret Trench Red Cross School, Macle hose Medical Rehabilitation Centre, Fung Yiu King Hospital, Chinese Christians Cemetery, Scenic Villa, Bisney Terrace and Bisney Villa;
 - ASDB2: St. Clare Girl's Secondary School, Honey Villa and Ocean View;
 - ASDB3: University of Hong Kong Football Field;

- Telegraph Bay
 - ATGH1: Baguio Villa;
 - ATGH2: Kong Sin Wan Tsuen;
 - ATGH3: Magnolia Villa and Point Breeze;

- Wah Fu
 - AWA F1: Wah Fu Estate;
 - AWA F2: Wah Kwai Estate and Ka Lung Court;

- Aberdeen
 - AABD1: Wah Fu Estate;
 - AABD2: Wah Kwai Estate and Ka Lung Court;

- Ap Lei Chau
 - AALC1: South Horizons which is out of the immediate vicinity of the proposed work site;

- Stonecutters Island Sewage Treatment Works
 - ASC1: Government Dockyard;
 - ASC2: Lai Chi Kok Water Boat Dock.

4.1.2 Noise Sensitive Receivers (NSRs)

A large number of NSRs have been identified in the vicinity of all of the proposed works sites under the Technical Memorandum on Environmental Impact Assessment (TMEIA). Figure 4.1.1 – 4.1.12 show the locations of NSRs. The following lists the NSRs in the vicinity of each of works site:

- Shau Kei Wan
 - NSKW1: Tam Kung Temple and Shau Kei Wan Primary School;
 - NSKW2: Shau Kei Wan Secondary School, Shau Kei Wan Church, Kam Fat Building, On Lok Building, Shing Chung Building, Hung Yun Building;

- Quarry Bay
 - NQUB1: Canossa College, Lai Chi Gardens, Ying Lai Court, Kam Fong Building, Fu King Building, Lai Wah Building, Lai King Building;
- North Point
 - NNPT1: Healthy Gardens, Island Place, Full Wealth Gardens, Bedford Gardens, Tanner Gardens, and other residential along Tanner Road;
 - NNPT2: Chan Wai Chow Primary, North Point Estate, Harbour Parade, other residential along Java Road, Marble Road and King's Road;
 - NNPT3: Po Shek Building, Yee King Building, Healthy Estate, Hoi Chi Court and Model Housing Estate;
- Wan Chai East
 - NWCE1: Animal home which is out of the immediate vicinity of the proposed work site;
- Wan Chai West
 - NWCW1: Hong Kong Academy for Performing Arts;
 - NWCW2: Servicemen's Guide Association;
- Central
 - NCEN1: a number of residential receivers beyond Connaught Road along Wing Lok Street, Bonham Road, Ko Sing Street, Queen's Road West and De Voeux Road West;
- Sandy Bay
 - NSDB1: Ho Sin Hang Home for the Elderly, Chuk Lam Ming Tong Care and Attention Home; The Duke of Kent Children's Hospital, John F. Kennedy Centre, Margaret Trench Red Cross School, Macle hose Medical Rehabilitation Centre, Fung Yiu King Hospital, Chinese Christians Cemetery, Scenic Villa, Bisney Terrace and Bisney Villa;
 - NSDB2: St. Clare's Girls' Secondary School, Honey Villa and Ocean View;
- Telegraph Bay
 - no existing NSRs in the vicinity of the proposed works site which is currently undeveloped, however, the occurrence of NSRs will be lead in future development;
- Wah Fu
 - NWAF1: Wah Kwai Estate and Ka Lung Court;
 - NWAF2: Wah Fu Estate;
- Aberdeen
 - NABD1: Wah Fu Estate, 2 primary schools and 1 secondary school;
 - NABD2: Wah Kwai Estate and Ka Lung Court;
- Ap Lei Chau
 - NALC1: South Horizons which is out of the immediate vicinity of the proposed work site;

- Stonecutters Island Sewage Treatment Works (SCISTW)
 - NSC1: on the western side of Stonecutters Island;

4.1.3 Water Quality Sensitive Receivers

Under the Technical Memorandum “Standard for Effluents Discharged into Drainage, and Sewerage Systems, Inland and Coastal Waters”, all of the discharge and site runoff should be within discharge standards for the relevant Water Control Zones. Impacts on these area need to be assessed in the EIA study. Water quality sensitive receivers are identified in the following Zones:

- Victoria Harbour WCZ: Shau Kei Wan Typhoon Shelter;
- Southern WCZ: Deep Water Bay, Repulse Bay and Middle Bay;
- Fish Culture Zones: Sok Kwu Wan and Luk Chau Wan on Lamma Island;
- Secondary Recreation Zones: the marine areas from Deep Water Bay to Shek O, around the southern coastline of Hong Kong Island and the northern coastline of Lamma Island.

4.1.4 Ecological Sensitive Receivers

The EIA study will be carried out prior to land clearance at the proposed works sites at Aberdeen and Sandy Bay where there are local tree stands, a mixture of shrub land and disused cultivation sites. Field surveys are required to investigate the sites ecological significance. Tree surveys should also be undertaken to determine the importance of local trees that would be lost and the requirement for replacement/mitigation.

4.1.5 Landscape and Visual Sensitive Receivers

Mitigation measures for landscape and visual impacts are required mostly in Sandy Bay since there are potential visual impacts caused by the plant's augmentation. Visual sensitive receivers include the adjacent Duke of Kent's Children Hospital, the Sage Madam Ho Sin Hong Home for the Elderly, the Margaret Trench Red Cross School, the Chuk Ming Tong Care and Attention Home for the Aged and the Maclehorse Medical Rehabilitation Centre. Works at Telegraph Bay will be undertaken concurrently with the Telegraph Bay Housing Development. Impacts of SSDS works will be insignificant compared to these works.

4.1.6 Cultural Heritage Sensitive Receivers

It can be referred to Section 3.2.1 that there is no major cultural heritage sensitive receiver in the immediate vicinity of most of the proposed site area.

4.2 Existing Environmental Elements

The most significance existing pollution sources in the surrounding environments of the proposed works sites are to air and noise quality. Impacts are greatest in the vicinity of Shau Kei Wan, Quarry Bay and North Point due to the presence of East Island Expressways. The cargo facility at Stonecutters Island is considered as another existing pollution source for SCISTW.

Others proposed works sites are located near residential districts and therefore their background noise and air levels are low.

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LET YUE MUN

SHAU KEI WAN PTW

- SHAU KEI WAN PTW EXPANSION
- TUNNEL PRODUCTION/DROP SHAFT
- TRANSFER PUMPING STATION

A L B R I C H R A Y

Engineer-in-Charge

LEGEND:

 PERMANENT LOCATION OF LAND REQUIRED


THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION

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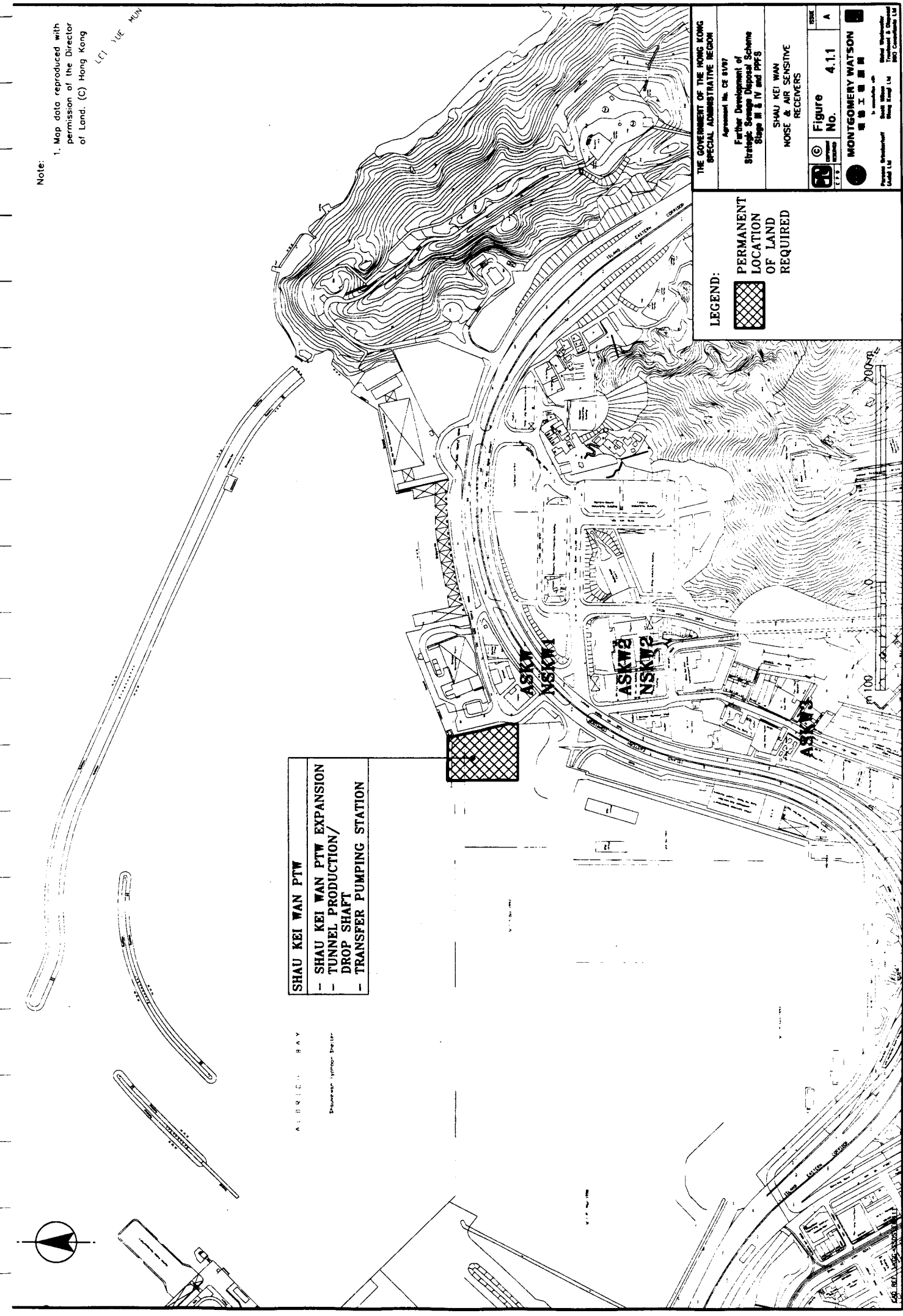
SHAU KEI WAN NOISE & AIR SENSITIVE RECEIVERS

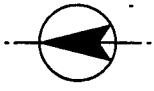
Figure No. 4.1.1 A

 MONTGOMERY WATSON

香港工務顧問

Project Manager: Wong Yung Lee
 Head Office: Hong Kong
 1877 Connaught Rd. E. #2000



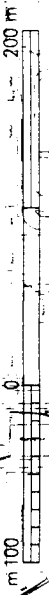
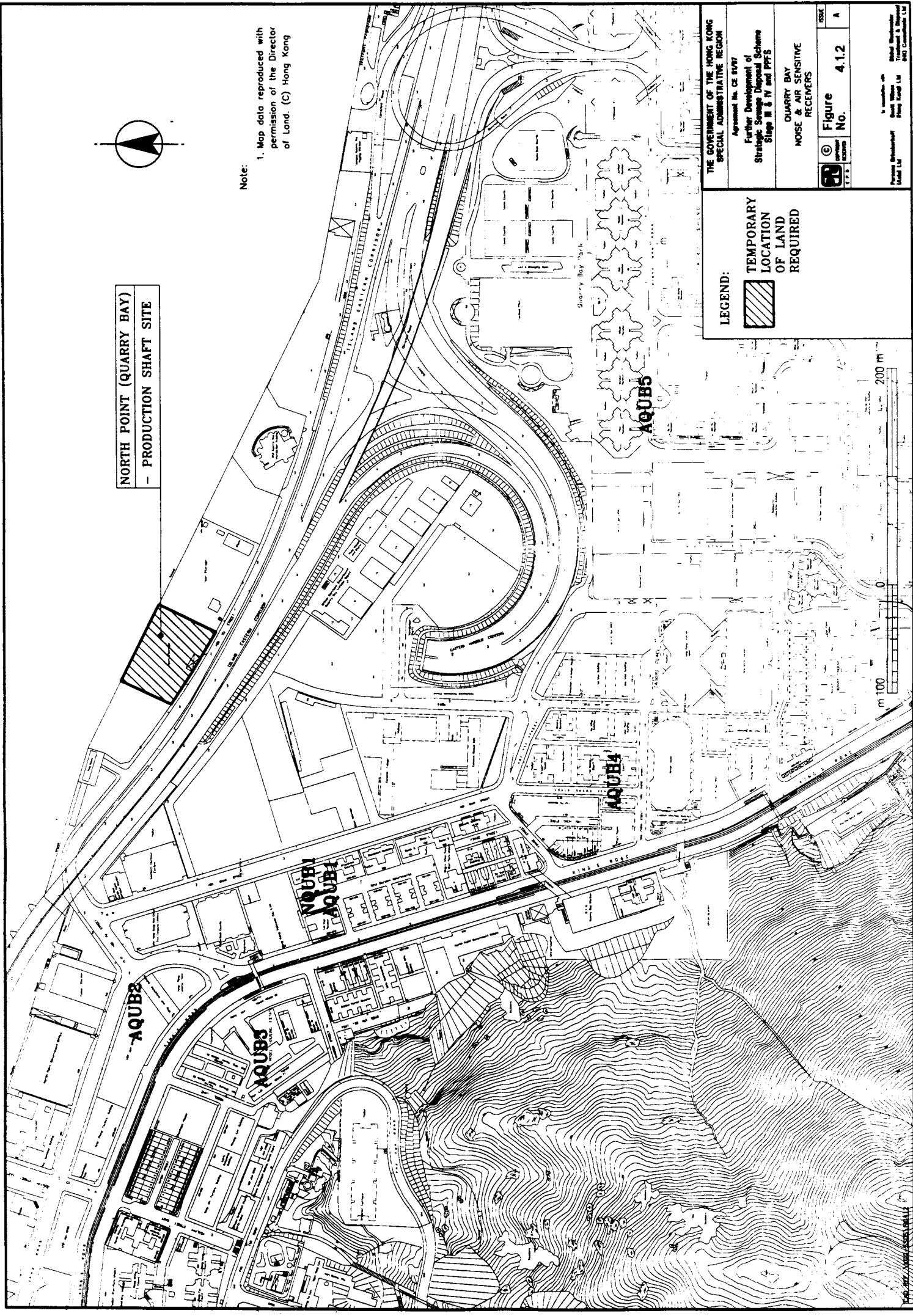


NORTH POINT (QUARRY BAY)
 — PRODUCTION SHAFT SITE

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NOISE & AIR SENSITIVE RECEIVERS	
Figure No.	4.1.2
ISSUE	A

LEGEND:
 TEMPORARY LOCATION OF LAND REQUIRED



1:10000
 Scale
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 1:10000
 Scale

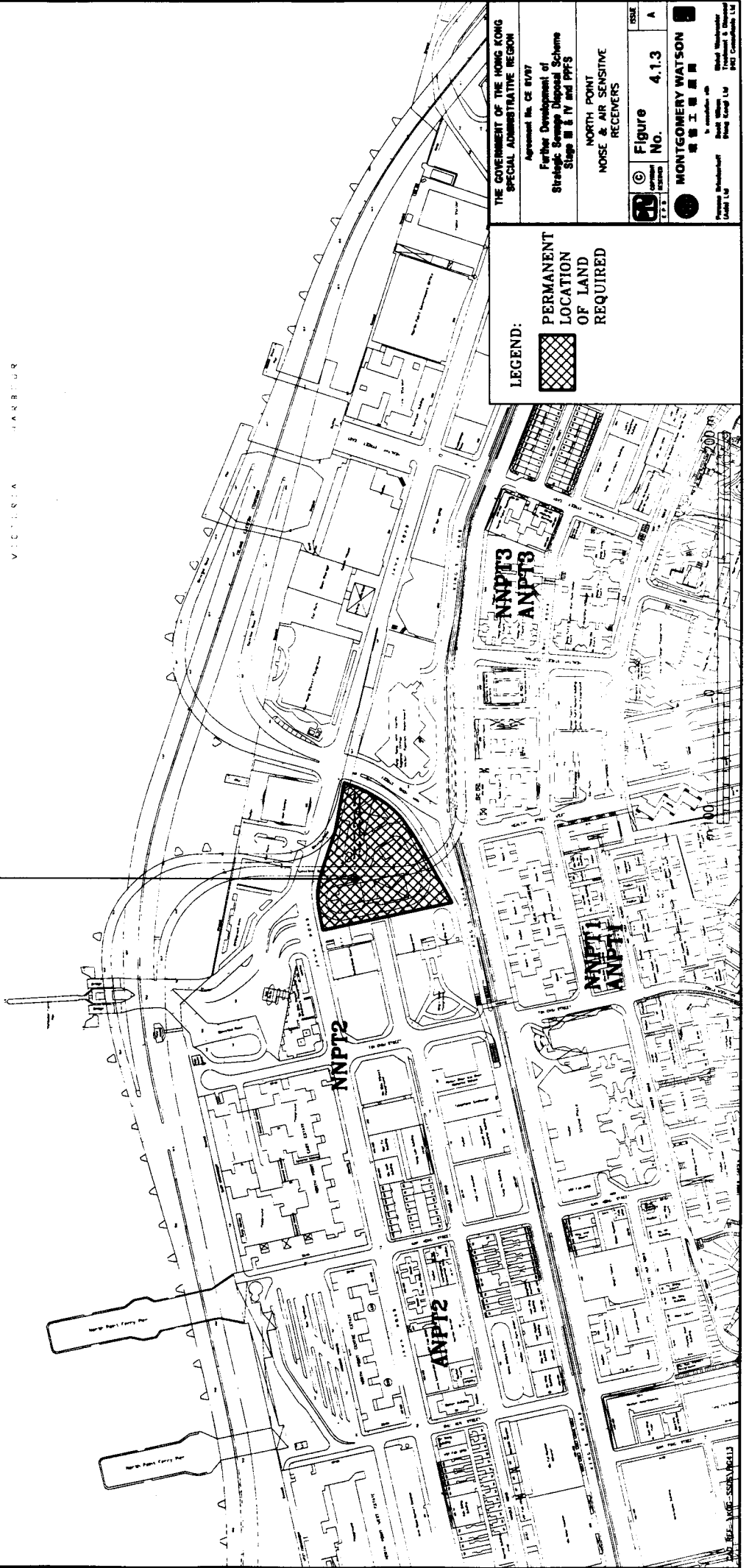
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NORTH POINT PTW
- DROP SHAFT
- PTW REDEVELOPMENT

VICTORIA HARBOR



LEGEND:



PERMANENT
LOCATION
OF LAND
REQUIRED

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Further Development of
Strategic Sewage Disposal Scheme
Stage III & IV and PFS

NORTH POINT
NOISE & AIR SENSITIVE
RECEIVERS

Scale: 1:2,000
Figure No. 4.1.3
A

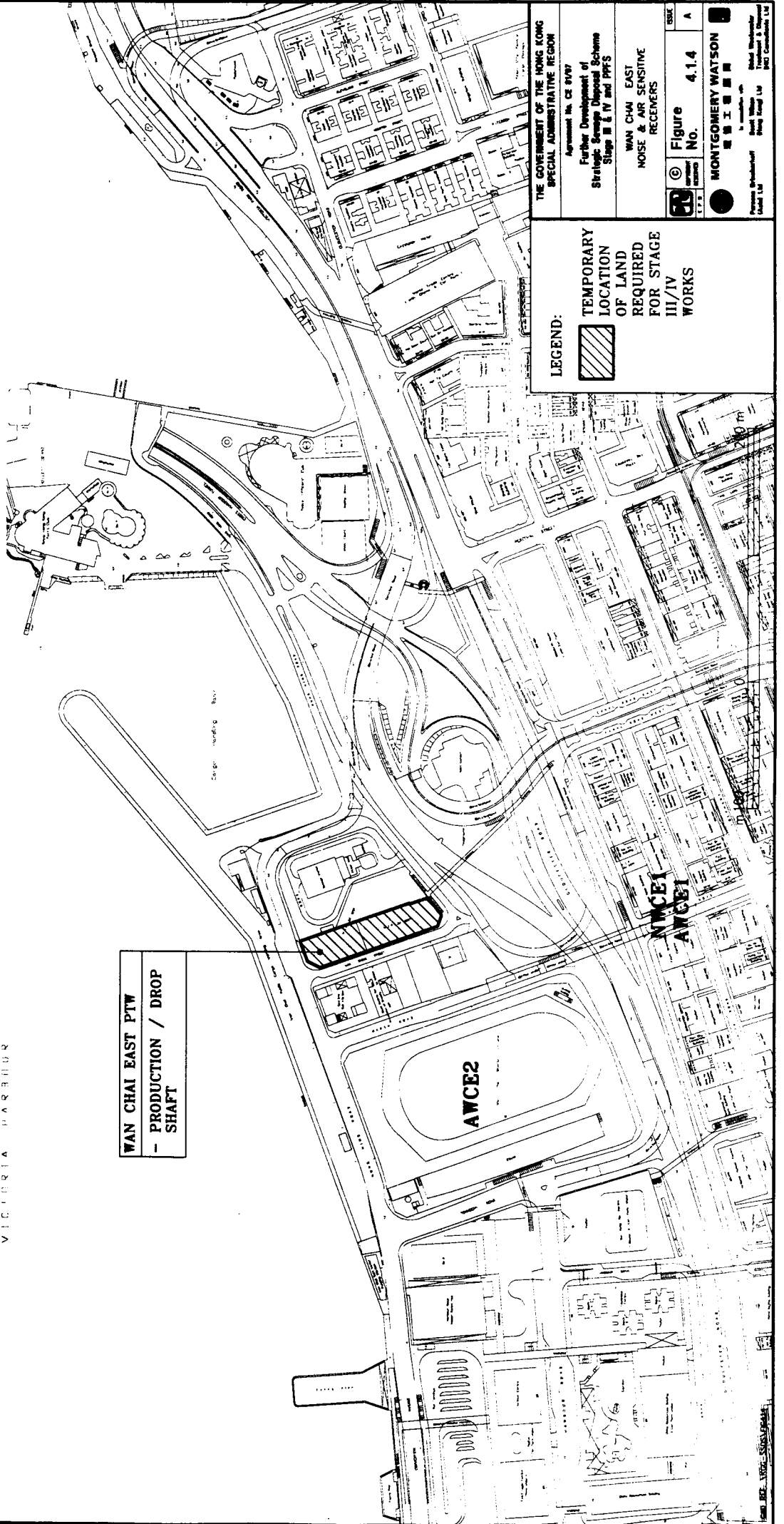
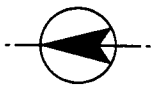
MONTGOMERY WATSON
顧問工程師
Project Manager
Project Officer
Hong Kong Ltd
Project Consultant

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VICTORIA HARBOUR

WAN CHAI EAST PTW
- PRODUCTION / DROP
SHAFT



LEGEND:

 TEMPORARY LOCATION OF LAND REQUIRED FOR STAGE III/IV WORKS

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Agreement No. CE 9747

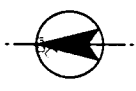
Further Development of Strategic Sewerage Disposal Scheme Stage III / IV and PPS

WAN CHAI EAST NOISE & AIR SENSITIVE RECEIVERS

Figure No. 4.1.4

DISK A

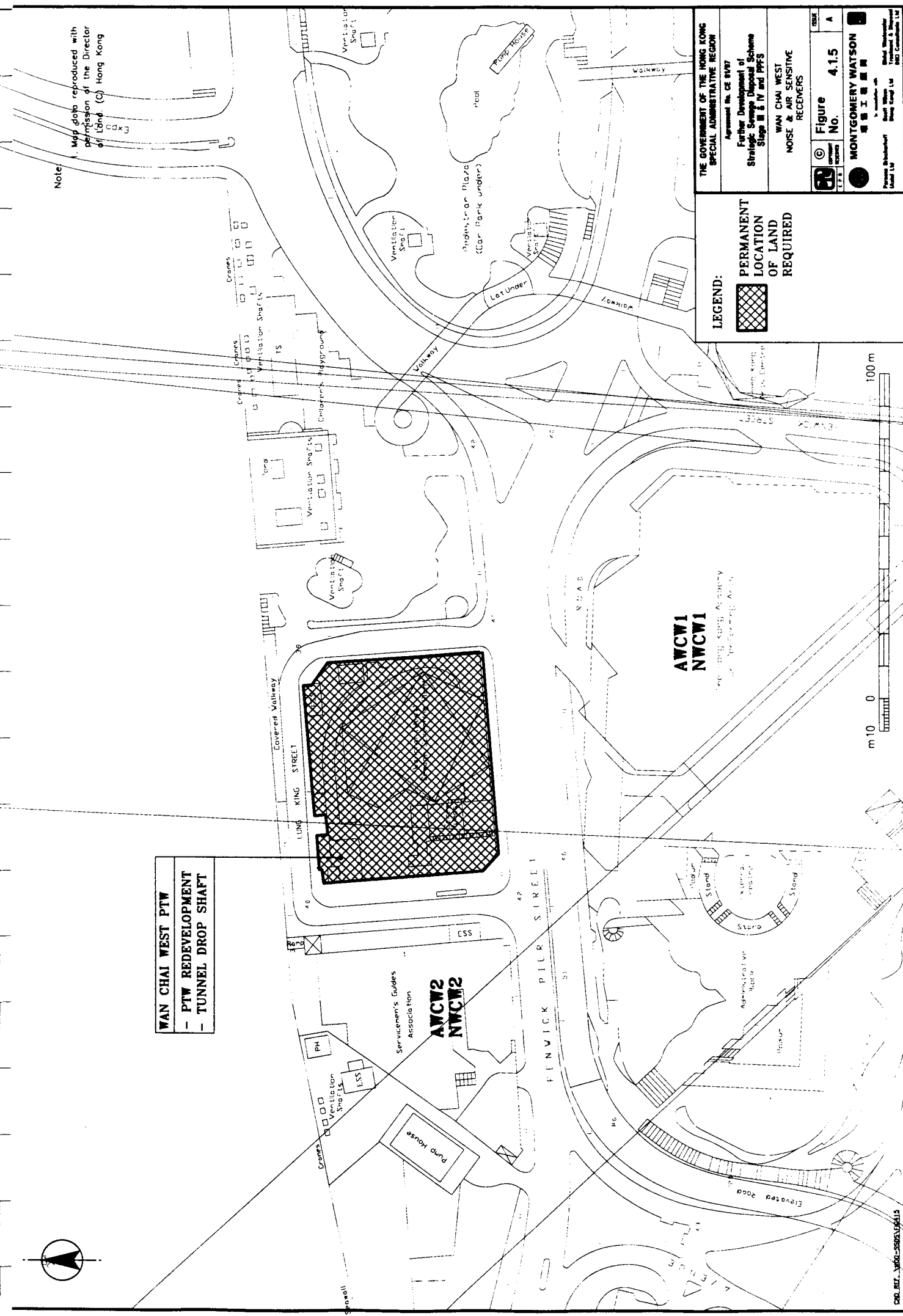
MONTGOMERY WATSON
Incorporated in Hong Kong
Professional Engineers
1001 Cantonment Road, Hong Kong, Ltd.



Note

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WAN CHAI WEST PTW
 - PTW REDEVELOPMENT
 - TUNNEL DROP SHAFT



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 Further Development of Strategic Sewage Disposal Scheme Stage III & IV and PPS
 WAN CHAI WEST NOISE & AIR SENSITIVE RECEIVERS

LEGEND:
 PERMANENT LOCATION OF LAND REQUIRED

Figure No. 4.15

MONTGOMERY WATSON
 蒙高美洋行
 香港工程師學會
 註冊工程師
 蒙高美洋行
 香港工程師學會
 註冊工程師

Scale: 1:1000
 Date: 1997
 Project: Further Development of Strategic Sewage Disposal Scheme Stage III & IV and PPS

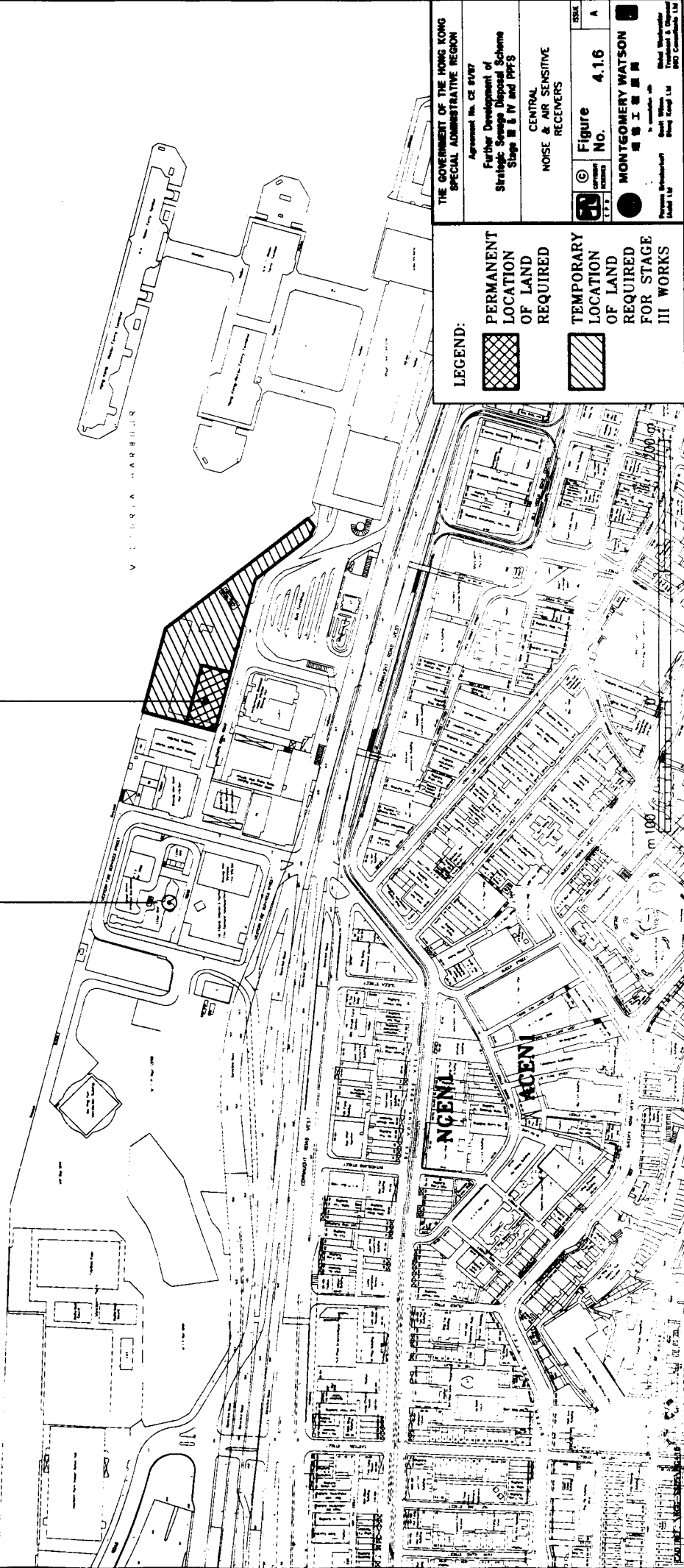




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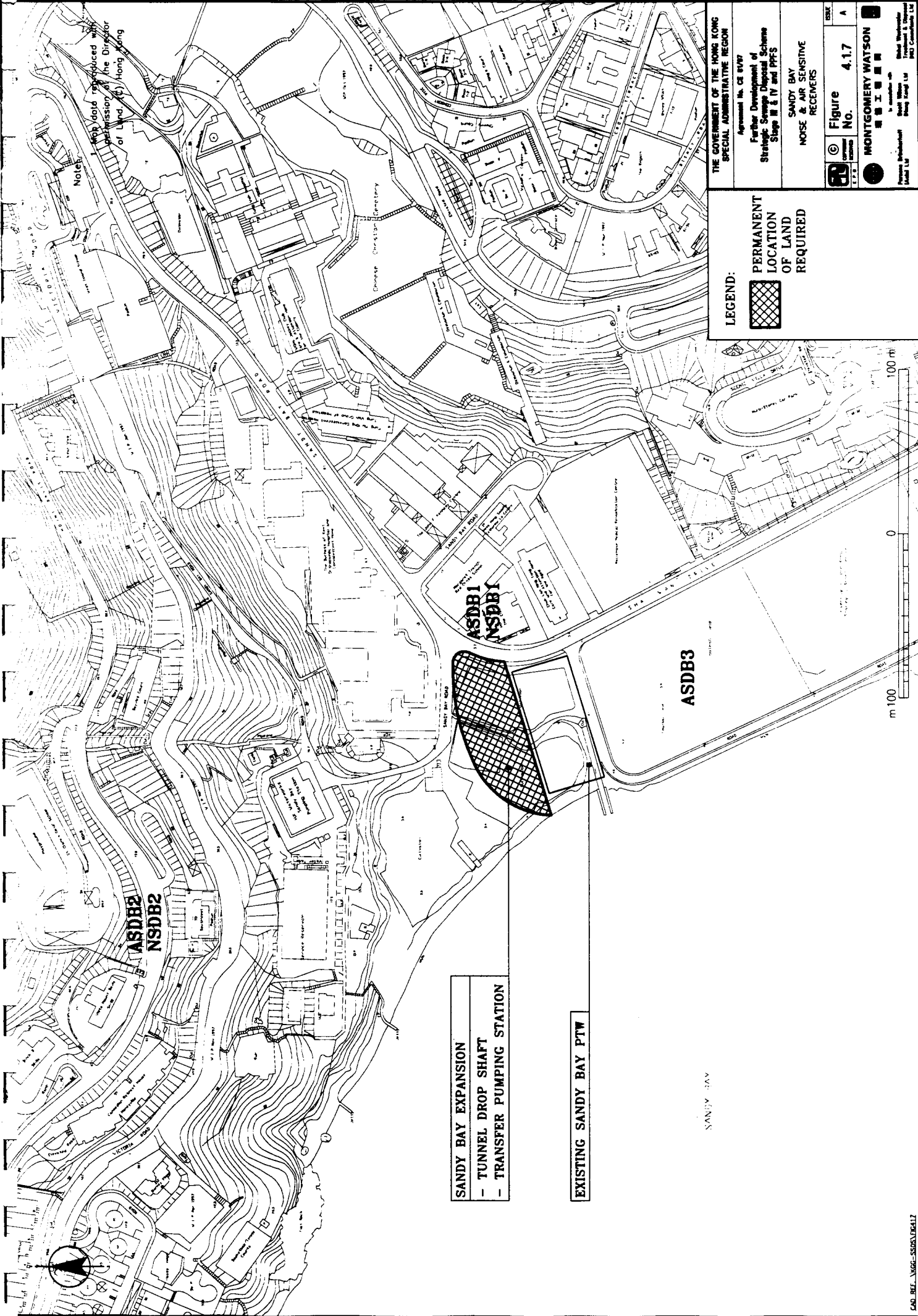
CENTRAL PTW
 — DROP SHAFT WITHIN EXISTING CENTRAL PTW

CENTRAL
 — PRODUCTION SHAFT
 — RISER/DROP SHAFT



LEGEND:
 PERMANENT LOCATION OF LAND REQUIRED
 TEMPORARY LOCATION OF LAND REQUIRED FOR STAGE III WORKS

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 Approval No. CS 91/97
 Further Development of Strategic Sewage Disposal Scheme Stage III & IV and PPS
 CENTRAL NOISE & AIR SENSITIVE RECEIVERS
 Figure No. 4.16
 MONTGOMERY WATSON
 羅敏申有限公司
 100, Queen's Road Central, Hong Kong
 100, Queen's Road Central, Hong Kong
 100, Queen's Road Central, Hong Kong
 100, Queen's Road Central, Hong Kong



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SANDY BAY NOISE & AIR SENSITIVE RECEMERS

Figure No. 4.1.7

MONTGOMERY WATSON
Professional Engineer
Sandy Bay
Hong Kong

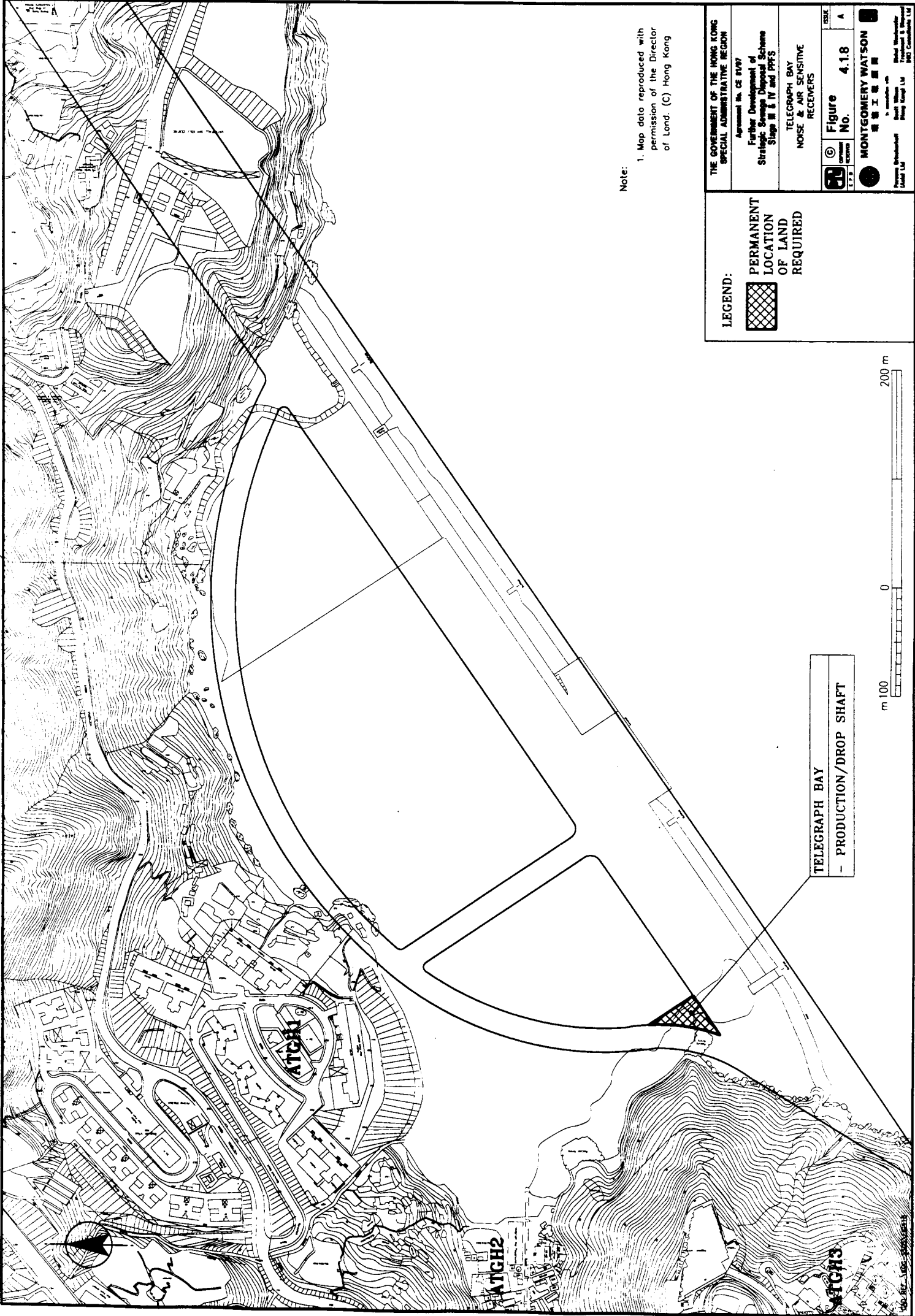
LEGEND:

 PERMANENT LOCATION OF LAND REQUIRED

SANDY BAY EXPANSION
— TUNNEL DROP SHAFT
— TRANSFER PUMPING STATION

EXISTING SANDY BAY PTW

0 100 m



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THE GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION Agreement No. CE 81/97 Further Development of Strategic Sewage Disposal Scheme Stage III & IV and PPS		TELEGRAPH BAY NOISE & AIR SENSITIVE RECEIVERS
	Figure No. 4.1.8	RSK A
MONTGOMERY WATSON 蒙高美洋行 In association with Project Architectural Planning & Design Limited 建築師樓宇設計有限公司		MONTGOMERY WATSON 蒙高美洋行

LEGEND:
 PERMANENT LOCATION OF LAND REQUIRED

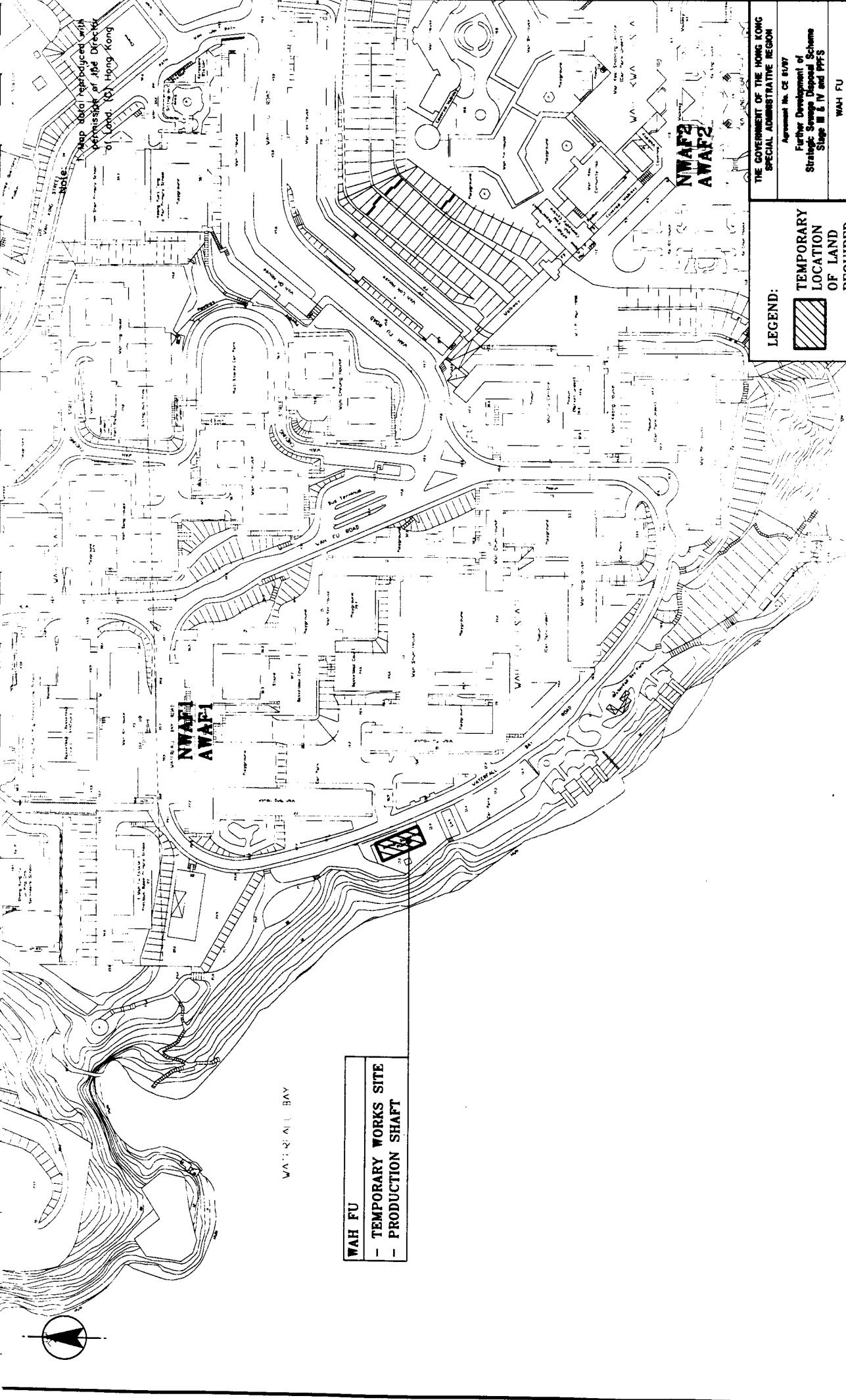
TELEGRAPH BAY
 - PRODUCTION/DROP SHAFT



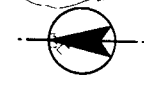
ATCH2

ATCH3

NO. 100, LEG. 20/1995



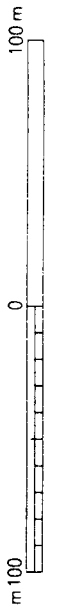
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WAH FU
 - TEMPORARY WORKS SITE
 - PRODUCTION SHAFT

LEGEND:

	TEMPORARY LOCATION OF LAND REQUIRED
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Further Development of Strategic Sewage Disposal Scheme Stage III & IV and PPS

NOISE & AIR SENSITIVE RECEIVERS

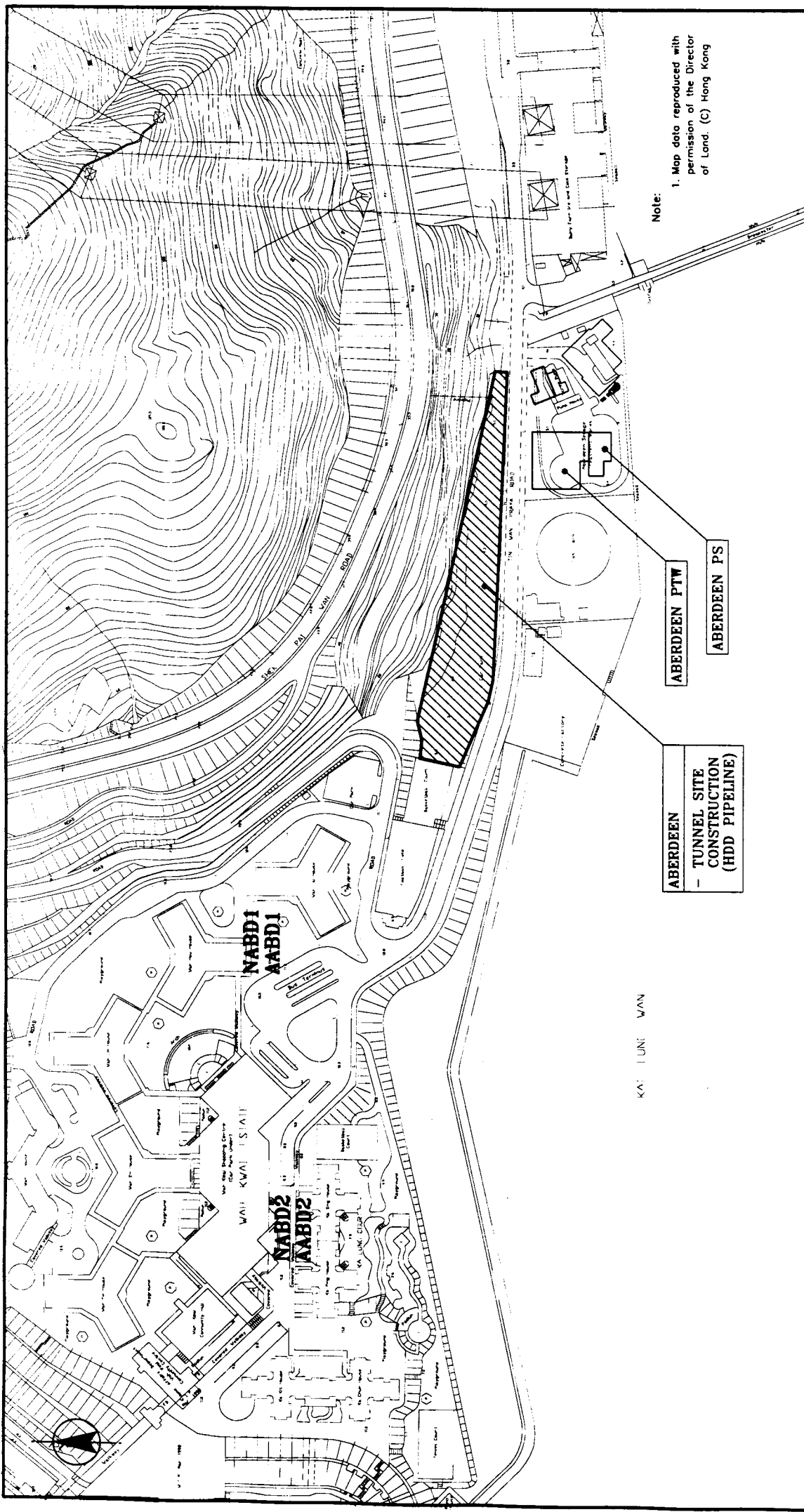
WAH FU

Scale	Figure No. 4.19	Sheet	A
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MONTGOMERY WATSON
 顧問工程師

Project Architect: Richard Watson
 Project Engineer: Wong Kwong Lun

Head Office: 1101-1102, 200 Canton Road, Kowloon, Hong Kong
 Telephone: 2705 7700
 Facsimile: 2705 8366



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 ABERDEEN NOISE & AIR SENSITIVE RECEIVERS


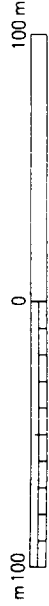
LEGEND:
 **TEMPORARY LOCATION OF LAND REQUIRED**

Figure No. 4.1.10
 A

MONTGOMERY WATSON
 蒙工務顧問
 In association with
 Small Offices
 Professional & Technical Staff Ltd
 Planning, Architecture, Surveying & Engineering
 100, Queen's Road Central, Hong Kong

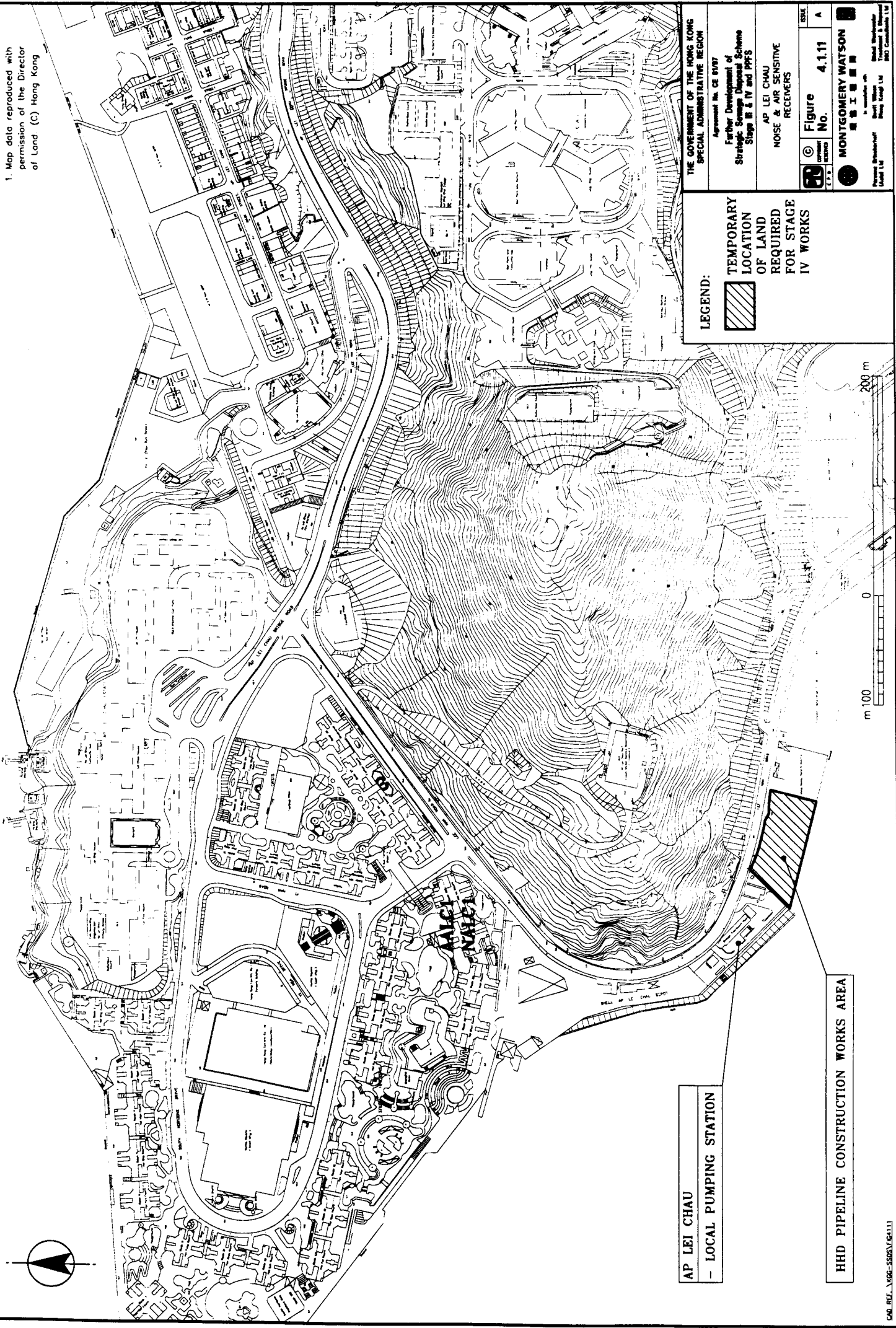
ABERDEEN PTW
ABERDEEN PS

ABERDEEN
 - TUNNEL SITE CONSTRUCTION (HDD PIPELINE)



Note:

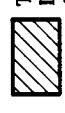
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AP LEI CHAU
- LOCAL PUMPING STATION

HHD PIPELINE CONSTRUCTION WORKS AREA

LEGEND:



TEMPORARY
LOCATION
OF LAND
REQUIRED
FOR STAGE
IV WORKS

THE GOVERNMENT OF THE HONG KONG
SPECIAL ADMINISTRATIVE REGION

Agreement No. CE 0197
Further Development of
Strategic Sewerage Disposal Scheme
Stage III & IV and PFS

AP LEI CHAU
NOISE & AIR SENSITIVE
RECEIVERS

Figure No. 4.1.11

SCALE
A

MONTGOMERY WATSON
測量工程師
香港測量師學會會員

Project Director: David Wong & Partner
Project Manager: David Tang & Partner
Monty Construction Ltd.

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 Agreement No. CE 01/97
 Further Development of Strategic Sewage Disposal Scheme Stage III & IV and PPS

STONECUTTERS NOISE & AIR SENSITIVE RECEIVERS

Figure No. 4.1.12 A

MONTGOMERY WATSON
 蒙工 顧問
 11, Gloucester Road, Hong Kong
 11, 嘉樂道, 香港

Scale: 1:10000
 Date: 1997

**ENVIRONMENTAL PROTECTION MEASURES &
FURTHER ENVIRONMENTAL IMPLICATIONS**

5.1 Potential Measures to Minimise Environmental Impacts

The SSDS Stage III/IV Preliminary Environmental Review has proposed various mitigation measures to minimise potential environmental impacts. These measures are outlined in the following section. Future EIA will recommend and investigate these measures in more detail.

5.1.1 *Construction Phase****Air Quality***

Dust generation is the largest potential impact on air quality during the SSDS Stage III/IV construction phase. Site contractors should ensure that all construction work is carried out in accordance with the Air Pollution Control (Construction Dust) Regulations. Standard dust mitigation measures include:

Excavation

- dust emission should be minimised during any surface excavation by limiting the extent of excavation;
- surfaces of excavation works should be compacted;
- temporary fabric covers may be required during windy conditions;
- completed earthworks should be promptly revegetated.

Material Handling

- the dropping height of material/waste should be minimised as far as practicable to limit fugitive emissions during loading and unloading of spoil;
- water should be applied to stockpiles of spoil of more than 50m³ during dry or windy conditions;
- stockpiles should be covered with tarpaulins.

Control of Vehicle Dust

- frequent watering should be used on unpaved haul routes and active construction areas;
- material/waste should be fitted with side boards and trail boards and also be covered by a tarpaulin properly secured and extended over the edges of the trail boards and side boards;
- vehicle speeds should be restricted to 8km/hr on site to minimise suspension and dispersion of dusts on site;
- wheel washing facilities should be provided on site to prevent track-out of mud and dusts on to the public highways;
- vehicle should be in well maintained that excessive vehicle emissions are not released.

Noise

Any construction requires Construction Noise Permit (CNP) and mitigation measures must be taken to comply with the applicable criteria. These mitigation measures include:

- silencing of noisy equipment and working methods should be used;
- all equipment and plant should be well maintained and not excessively noisy due to poor maintenance;
- movable noise barriers and enclosures can be used;
- good site practice should be used to limit noise emission at sources;
- intrusive noisy activities should be scheduled for periods to ensure the minimum numbers of persons are affected and limit the amount of concurrent activities;
- alternative construction method will be replaced blasting whenever circumstance allows.

Water Quality

To meet standards in “Technical Memorandum on Effluents Discharged into Drainage and Sewerage System, Inland and Coastal Waters”, the following mitigation measures should be taken:

- appropriate drainage facilities and standard good site management and practices can control construction site runoff and protect the marine environment near the works sites;
- settling lagoons and grease/oil traps should be designed to control runoff from site areas;
- settled slurry or mud should be disposed of to the nearest landfill site;
- proper site management to prevent debris and harmful material from reaching drainage facilities and water bodies;
- all domestic effluent from Contractor and RSS facilities should be disposed via foul sewers.

Waste Management

In order to meet the relevant standards as specified in the Waste Disposal Ordinance, the following waste mitigation measures should be undertaken to minimise impact from construction waste arisings:

- general good waste management plan and practice should be identified;
- inert material deemed suitable for fill should, if possible, be re-used and recycle;
- re-used and recyclable material should be handled and stored in a appropriate manner which is without loss and leakage;
- other construction waste/inert materials deemed unsuitable for reuse or recycle should be ensured to dispose in an appropriate manner and they should be separated by category;
- chemical waste should be stored in accordance with approved methods defined in the regulations;
- alternative method will be replaced transporting excavated wastes to the marine barging point using trucks whenever circumstance allows.

Ecology

Specific ecological mitigation measures are required in Aberdeen and Sandy Bay due to the land clearance at these sites. A tree survey should be undertaken in order to define the number of trees affected by the development and their potential significance and compensation can be suggested such as re-provisioning and replanting.

Landscape and Visual

Mitigation measures can be taken to minimise visual intrusion and site disruption such as appropriate construction phasing and programming, siting of site equipment/plant and site screening.

Cultural Heritage

Mitigation measures for cultural heritage impacts is required at the Shau Kei Wan site. Construction should be undertaken in a manner so that there are no adverse impacts to the Tam Kung Temple and other historic buildings and structures which are in the vicinity of the proposed works.

5.1.2 Operational Phase

Air Quality

Odour is the major impact on air quality at all PTWs. Mitigation measures to be taken include covering all potential odour sources such as channels, wells, grit/grease traps and screening. Also care needs to be taken especially in the design of deodorisation facilities for the expansion of SCISTW, particular in the sludge handling facility.

Further investigation should be undertaken for the H₂S emission from pumping stations.

Noise

No particular noise mitigation measures are required during the operational phase. This will be confirmed through detailed noise modelling undertaken as part of the EIA study.

Water Quality

Further study of the impacts of the interim discharge of combined Stage I/III/IV flows through the Stage I and North West Kowloon outfalls will be undertaken in the EIA study.

Waste Management

The latest practices will be followed.

Ecology

No specific mitigation measures are anticipated to be required during the SSDS Stage III/IV operational phase given that beneficial effects on marine ecology are anticipated. Residual impacts in receiving waters for the long outfall will be fully addressed in the Stage II EIA including specific mitigation, if any, for the additional effluent loads arising from Stage III/IV.

Landscape and Visual

Visual impacts of all Stage III/IV structures will be minimised by the incorporation of architectural designs sympathetic to adjacent land uses, buildings and landscaping. Vegetation planting designs can also be a mitigation measure by screening works from local residents and the general public.

Cultural Heritage

No specific mitigation measures will be required.

Hazardous Materials

Ferric chloride is the main hazardous reagent used for sewage treatment. It will be stored in tanks which are acid resistant. Therefore, no specific mitigation measures will be required. However, it should be handled in accordance with good industrial hygiene and safety practice including:

- protective clothes, plastic gloves and safety glasses should be worn during handling;
- contact of ferric chloride with alkalis and metals should be avoided.

5.2 Possible Severity, Distribution and Duration of Environmental Effects

The impacts on air, noise, water quality, waste, ecology, visual and cultural heritage will be an issue for the duration of construction between early 2001 to early 2010. Their severity and distribution is outlined in Section 3.

Air impact will be the most severe during earthworks, excavation and the operation of the sludge handling facilities. Noise impact will also be the most severe during construction procedures such as excavation, piling and concreting.

Information concerning the impact of the cumulative effects of the proposed SSDS Stage III/IV is limited at this stage due to the lack of definitive programming for other developments, works and adjacent projects.

5.3 Further Implications

Public interest is expected to be moderate as most of the PTWs and pumping stations which are located in the vicinity of residential districts. However, these construction and expansion of PTWs and pumping stations are for the benefit of the public; creating jobs and providing additional service.

USE OF PREVIOUSLY APPROVED EIA REPORTS

6.1 Use of Previously Approved EIA Reports

As stated in Section 1.2, the Stage II will provide a transfer and pumping system to convey the Stage I and Stage III/IV effluent from the SCISTW to an oceanic outfall east of Lamma as well as disinfection facilities. A separate EIA study under the Stage II Project is being conducted.