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**Drainage Services Department Practice Note No. 2/2017**

**Assessment on the Effects of Construction Activities on Drainage and Sewage  
Tunnels and their Associated Structures**

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Date of Issue : 27 December 2017

## **1. SCOPE**

- 1.1 This Practice Note (PN) applies to civil engineering works/construction developments situated on or adjacent to the tunnel protection zones (PZs) of seven drainage/sewage tunnels of the Drainage Services Department (DSD), namely Hong Kong West Drainage Tunnel (HKWDT), Kai Tak Transfer Scheme Drainage Tunnel (KTTSdT), Lai Chi Kok Drainage Tunnel (LCKDT), Tsuen Wan Drainage Tunnel (TWDT), North West New Territories Sewage Tunnel (NWNtST), Tolo Harbour Effluent Tunnel (THET) and Tseung Kwan O Sewage Tunnel (TKOST), and their associated structures (hereafter abbreviated to “the DSD Tunnels”)<sup>1</sup>.
- 1.2 The DSD Tunnels have to be protected against damage which may be caused by construction works or ground investigation works in the vicinity of the tunnels. Project proponents responsible for these works including private developers and government works departments (such as the Architectural Services Department, the Civil Engineering and Development Department (CEDD), the Highways Department, the Housing Department and the Water Supplies Department, etc.) are required to observe the technical guidelines specified in this PN.

## **2. GENERAL**

- 2.1 The DSD Tunnels refer to the underground tunnels and their associated structures including shafts, dropshafts and adits connecting to these tunnels for transfer of stormwater or sewage.
- 2.2 For the purposes of this PN, the term “rock” is defined as Grades I, II and III rock material according to Table 4 (Classification of Rock Material Decomposition Grades) of Geoguide 3 (Guide to Rock and Soil Descriptions) published by the Geotechnical Engineering Office of CEDD. The term “soil” is defined as Grades IV, V and VI rock materials as defined in Table 4 of Geoguide 3 as well as reclamation materials/fill, debris flow, marine and alluvial deposits.
- 2.3 Leakage of sewage or migration of gas from or into these tunnels may pose health and safety risks. These risks must be evaluated when considering any proposed works near the DSD Tunnels, especially in dewatering works which may have potential for migration of hazardous substances in groundwater near the DSD Tunnels.

## **3. TECHNICAL GUIDELINES**

- 3.1 Proposals for any works within the tunnel PZs of the DSD Tunnels shall be subject to special scrutiny and agreement by DSD before works commence. The indicative

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<sup>1</sup> The requirements and procedures for assessing the effects on Harbour Area Treatment Scheme sewage tunnels shall refer to the relevant Technical Circular of the Development Bureau.

boundaries of tunnel PZs of the DSD Tunnels are shown in the attached Plan Nos. HKWDT/01, HKWDT/02, KTTSDT/01, LCKDT/01, TWDT/01, NWNTST/01, NWNTST/02, THET/01, THET/02 and TKOST/01. Their detailed alignments shall refer to the drainage record plans kept by the respective District Division of DSD. DSD shall be consulted if there is any query concerning the alignments and/or the extents of the tunnel PZs of the DSD Tunnels.

- 3.2 Each proposal shall be assessed based on its individual technical merits and subject to the requirements as stipulated below.

### **Site Formation or Foundation Works**

- 3.3 Where construction works (including site formation, foundation works or excavation for basements, shafts, tunnels and the like) other than ground investigation are proposed within the tunnel PZs of the DSD Tunnels, the following requirements on the works and the effects of the works shall be followed:

- (a) Changes in vertical or horizontal pressure

The vertical or horizontal pressure on any structure in soil due to the proposed construction works (including filling and dewatering) and due to change of loads transmitted from foundations (including loads arising during construction) shall not be varied by more than 20kPa, or by 5% of the total overburden pressure for structures at depths greater than 20m, whichever is the greater. For structures in rock, where it is not possible to assess the change in ground pressure due to the above operations, the hydrostatic pressure shall not be increased or decreased by more than 50kPa.

- (b) Differential movement

Differential movement resulting from the works shall not produce final distortion in any structures exceeding 0.1% of internal diameter/width and the total movement in any structure shall not exceed 20mm in any plane.

- (c) Limits of peak particle velocities

The peak particle velocities induced to the DSD Tunnels resulting from blasting (where permitted) or from driving or extraction of piles or any similar operation which can induce vibration shall not exceed 25mm/sec for blasting and 15mm/sec for other operations.

- (d) Clearance from Structure

- i. No hole or excavation shall be sunk or excavated within a distance of 3m from any point of the DSD Tunnels without prior agreement by DSD for the works and the method to be employed.

- ii. No pile, foundation, borehole, well, soil nail, horizontal drain, rock bolt/dowel, part of a ground anchor and/or other geotechnical installation shall be driven or constructed within a distance of 3m from any point of the DSD Tunnels.
- 3.4 The project proponents shall submit proposals for monitoring the effects on the DSD Tunnels to DSD for agreement before commencement of works. Subsequent data together with the interpretation shall be submitted to DSD during construction until completion of the works or movement/ pressure change becomes steady after completion of the works, whenever is later. Where the proposed works or any part of the proposed works shall come within a distance of 10m from any point of the DSD Tunnels, the submission shall also include detailed method statements for constructing the proposed works and for monitoring the alignment/depth of the proposed works.

### **Ground Investigation Works**

- 3.5 Where ground investigations are proposed within the tunnel PZs of the DSD Tunnels, the project proponents are required to submit the following information to DSD.
- (a) Details of the exploration and locations of the proposed exploration holes, trial pits, trenches, field testing or instrumentations.
  - (b) Proposed depth of drillholes, pits, trenches, field testing or instrumentation.
  - (c) A method statement for sinking drillholes, excavating trial pits and trenches including back-filling, conducting field testing or installing instrumentation.
  - (d) A method statement for monitoring and checking the alignment and depth of drillholes when the minimum distance from a drillhole to any point of the DSD Tunnels is less than 10m in any plane.
- 3.6 Proposals will also be examined with reference to the following guidelines:
- (a) Clearance from structure

No drillhole shall be sunk within a distance of 3m from any point of the DSD Tunnels.
  - (b) Changes in vertical or horizontal pressure

The vertical and horizontal pressure on any structure in soil due to ground investigation works (including field testing like plate load test, pressure meter test, packer test or any operation) shall not be varied by more than 20kPa, or

by 5% of the total overburden pressure for structures at depths greater than 20m, whichever is the greater. For structures in rock, where it is not possible to assess the change in ground pressure due to the above operations, the hydrostatic pressure shall not be increased or decreased by more than 50kPa.

(c) Limits of peak particle velocities

The peak particle velocities induced to the DSD Tunnels resulting from artificial shocks generated either by the detonation of explosives or a mechanical blow at ground surface or at depth within a hole shall not exceed 25mm/sec. The peak particle velocities induced to any structure resulting from percussive drilling, hammer drilling or any other site operation which can induce vibration, shall not exceed 15mm/sec.

**Dewatering Works and Wells**

- 3.7 Assessment shall be made regarding the leakage of sewage and the migration of gas in respect of all dewatering and well proposals within the tunnel PZs of the DSD Tunnels.

**4. EXEMPTIONS**

- 4.1 The following minor works are exempted from the above-mentioned assessment.
- (a) Road opening, construction of road pavement, street furniture and associated road drainage works.
  - (b) Excavation of trial pits and trenches, laying of underground utility services within the DSD tunnel protection zones at a distance greater than 3m from any point of the DSD Tunnels with a depth less than 3m from ground level.
  - (c) Maintenance of roads, highway structures, street furniture and associated road drainage works where piling works are not involved.
  - (d) Landscaping and planting.
  - (e) Erection/modification of street lighting and other street furniture/traffic and highway facilities where piling works are not involved.
  - (f) Maintenance and repair of slopes.
  - (g) Emergency repairs of existing underground utility services, such as water mains, sewers and drains.

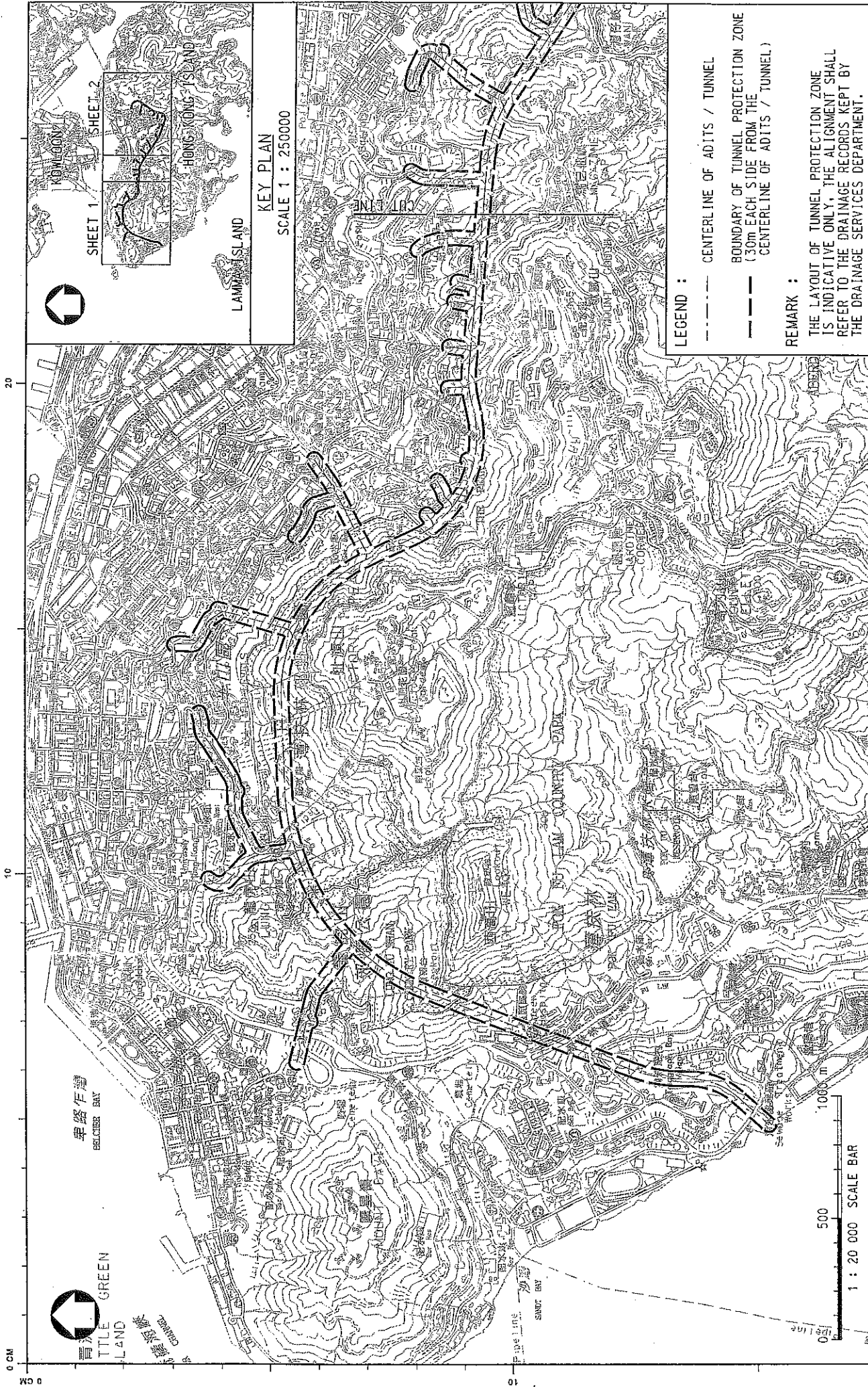
## 5. DRAWINGS


HKWDT/01	Tunnel Protection Zone of Hong Kong West Drainage Tunnel (Sheet 1 of 2)
HKWDT/02	Tunnel Protection Zone of Hong Kong West Drainage Tunnel (Sheet 2 of 2)
KTTSDT/01	Tunnel Protection Zone of Kai Tak Transfer Scheme Drainage Tunnel
LCKDT/01	Tunnel Protection Zone of Lai Chi Kok Drainage Tunnel
TWDT/01	Tunnel Protection Zone of Tsuen Wan Drainage Tunnel
TKOST/01	Tunnel Protection Zone of Tseung Kwan O Sewage Tunnel
NWNTST/01	Tunnel Protection Zone of North West New Territories Sewage Tunnel (Sheet 1 of 2)
NWNTST/02	Tunnel Protection Zone of North West New Territories Sewage Tunnel (Sheet 2 of 2)
THET/01	Tunnel Protection Zone of Tolo Harbour Effluent Tunnel (Sheet 1 of 2)
THET/02	Tunnel Protection Zone of Tolo Harbour Effluent Tunnel (Sheet 2 of 2)



( K W MAK )

Deputy Director of Drainage Services

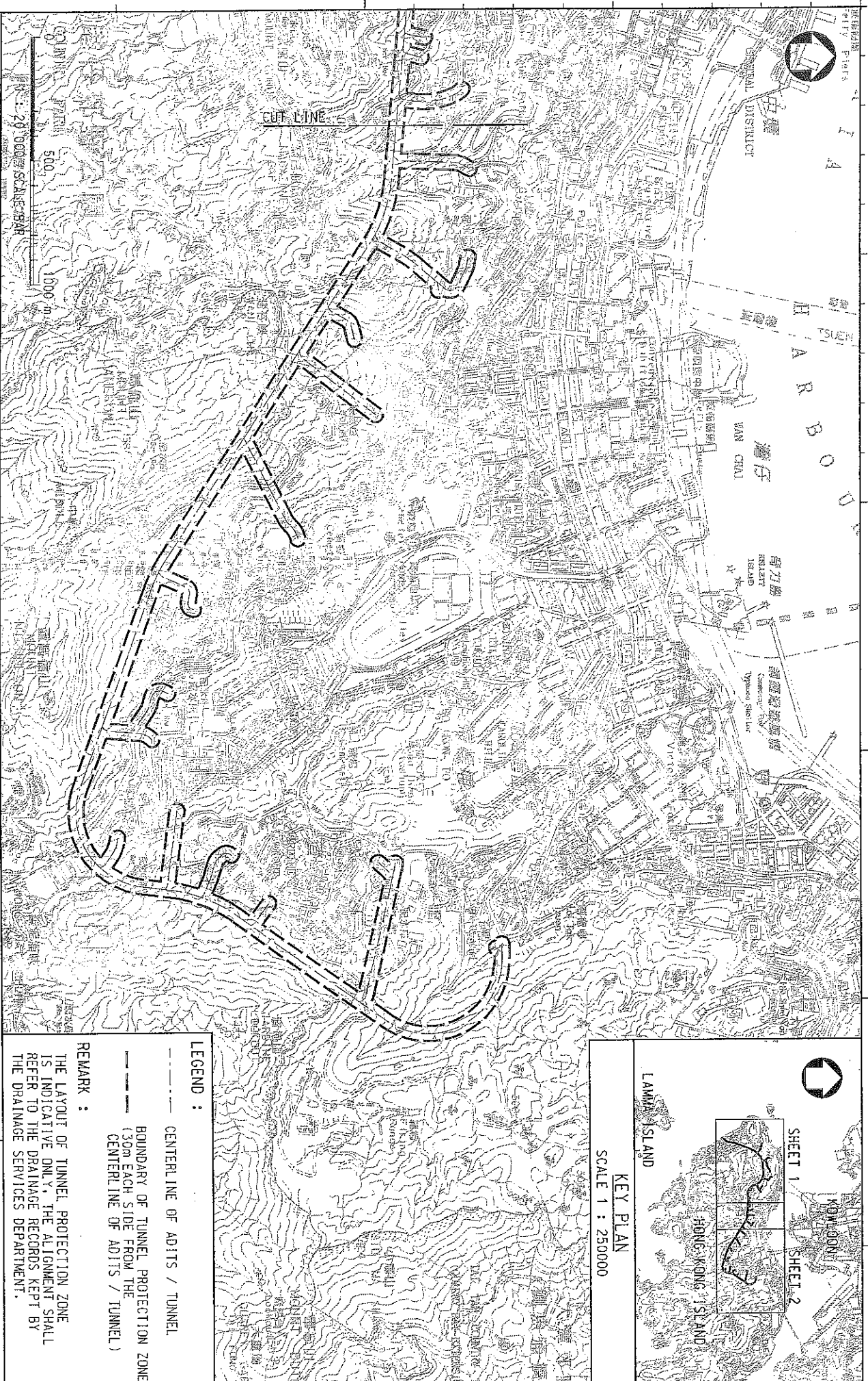




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**TUNNEL PROTECTION ZONE OF HONG KONG WEST DRAINAGE TUNNEL**  
(SHEET 1 OF 2)

PLAN No. HKWDT/01



SHEET 1  
SHEET 2



LAMAU ISLAND

KEY PLAN

SCALE 1 : 250000

LEGEND :

----- CENTER LINE OF ADITS / TUNNEL

----- BOUNDARY OF TUNNEL PROTECTION ZONE  
(30m EACH SIDE FROM THE CENTERLINE OF ADITS / TUNNEL)

REMARK :

THE LAYOUT OF TUNNEL PROTECTION ZONE IS INDICATIVE ONLY, THE ALIGNMENT SHALL REFER TO THE DRAINAGE RECORDS KEPT BY THE DRAINAGE SERVICES DEPARTMENT.

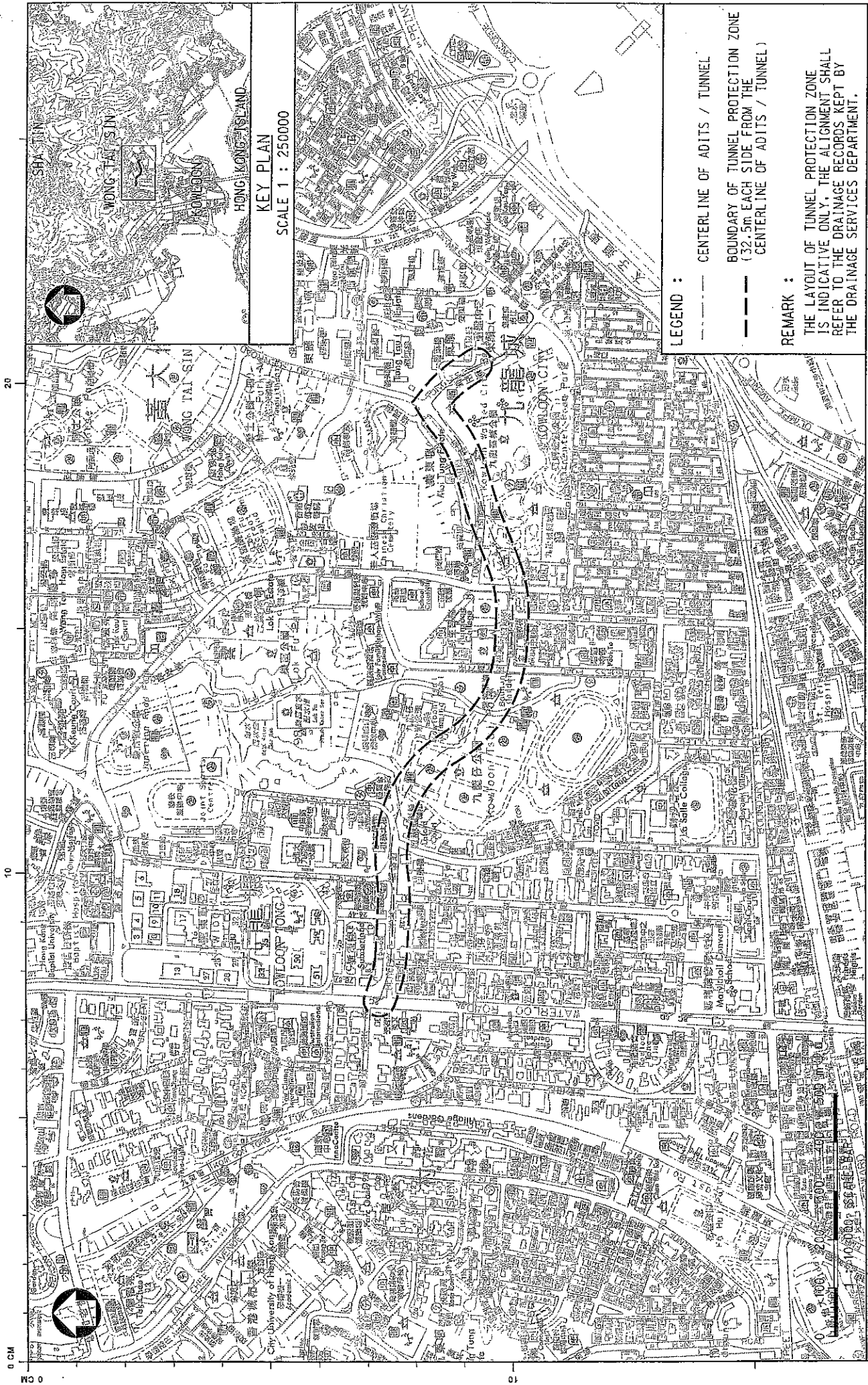


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TUNNEL PROTECTION ZONE OF HONG KONG WEST DRAINAGE TUNNEL  
(SHEET 2 OF 2)

PLAN NO. HKWDT/02





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# TUNNEL PROTECTION ZONE OF KAI TAK TRANSFER SCHEME DRAINAGE TUNNEL

PLAN No. KTTSdT/01

**LEGEND :**

- CENTERLINE OF ADITS / TUNNEL
- BOUNDARY OF TUNNEL PROTECTION ZONE (32.5m EACH SIDE FROM THE CENTERLINE OF ADITS / TUNNEL)

**REMARK :**

THE LAYOUT OF TUNNEL PROTECTION ZONE IS INDICATIVE ONLY. THE ALIGNMENT SHALL REFER TO THE DRAINAGE RECORDS KEPT BY THE DRAINAGE SERVICES DEPARTMENT.



KEY PLAN  
SCALE 1 : 250000

TSINGI  
KOWLOON  
KOWLOON  
KOWLOON

LEGEND :

— CENTERLINE OF ADITS / TUNNEL.

--- BOUNDARY OF TUNNEL PROTECTION ZONE  
(36m EACH SIDE FROM THE  
CENTERLINE OF ADITS / TUNNEL)

REMARK :

THE LAYOUT OF TUNNEL PROTECTION ZONE  
IS INDICATIVE ONLY. THE ALIGNMENT SHALL  
REFER TO THE DRAINAGE RECORDS KEPT BY  
THE DRAINAGE SERVICES DEPARTMENT.

TUNNEL PROTECTION ZONE OF LAI CHI KOK DRAINAGE TUNNEL

PLAN NO. LCKDT/01



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## LEGEND :

--- CENTERLINE OF ADITS / TUNNEL

--- BOUNDARY OF TUNNEL PROTECTION ZONE  
(30m EACH SIDE FROM THE  
CENTERLINE OF ADITS / TUNNEL)

## REMARK :

THE LAYOUT OF TUNNEL PROTECTION ZONE  
IS INDICATIVE ONLY, THE ALIGNMENT SHALL  
REFER TO THE DRAINAGE RECORDS KEPT BY  
THE DRAINAGE SERVICES DEPARTMENT.

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1 : 20 000 SCALE BAR

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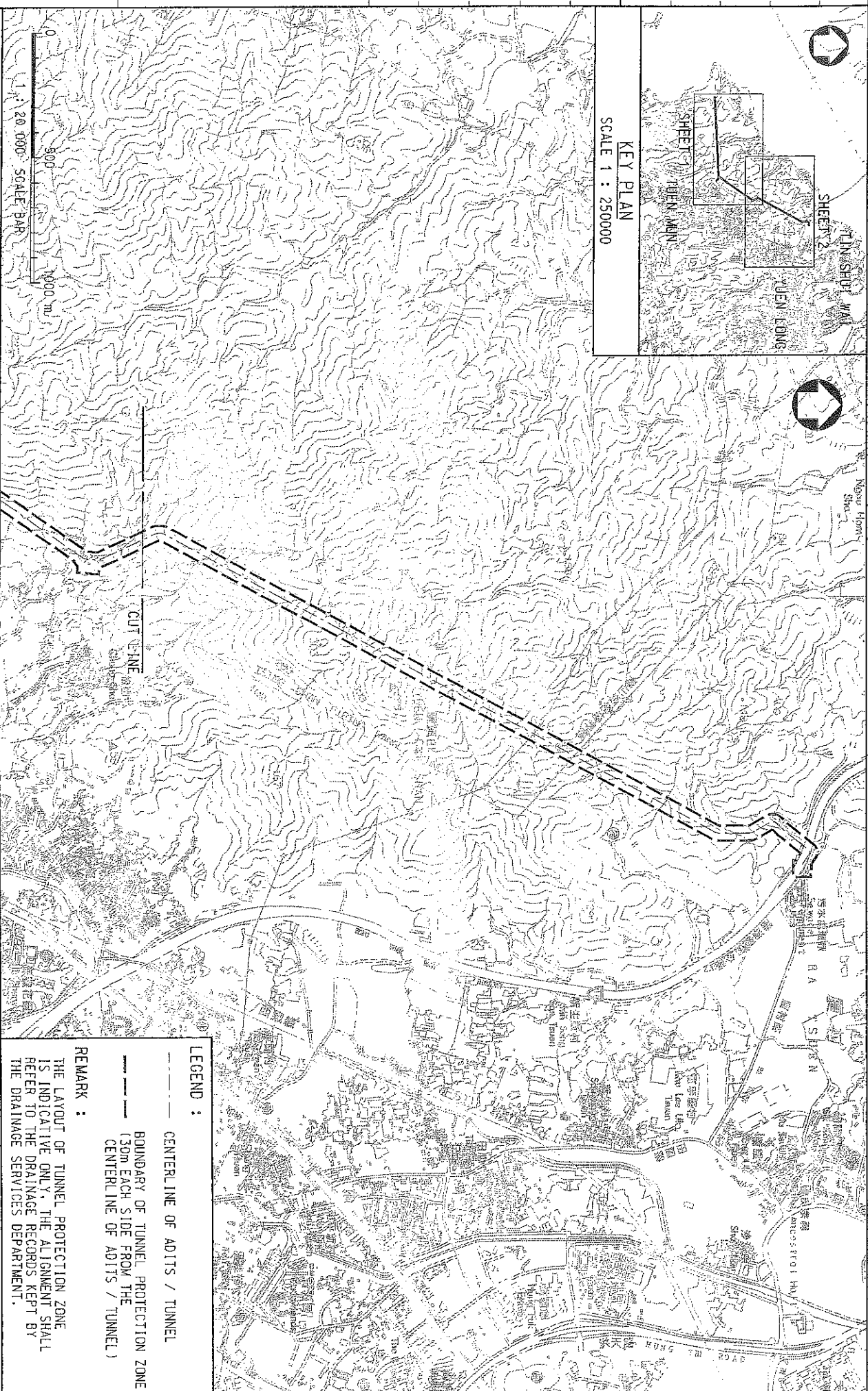
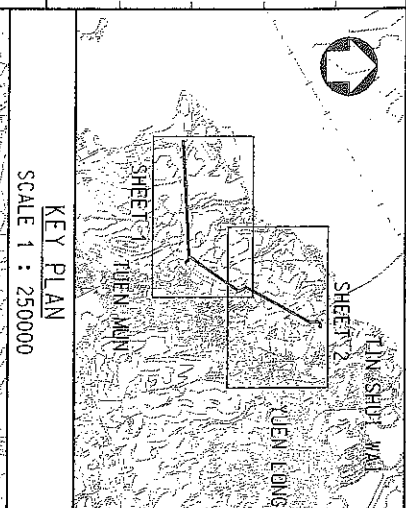
## TUNNEL PROTECTION ZONE OF TSUEN WAN DRAINAGE TUNNEL

PLAN No. TWDT/01









LEGEND :

--- CENTERLINE OF ADITS / TUNNEL

--- BOUNDARY OF TUNNEL PROTECTION ZONE (30m EACH SIDE FROM THE CENTERLINE OF ADITS / TUNNEL)

REMARK :

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TUNNEL PROTECTION ZONE OF NORTH WEST NEW TERRITORIES SEWAGE TUNNEL  
(SHEET 2 OF 2)

PLAN NO. NWNST/02



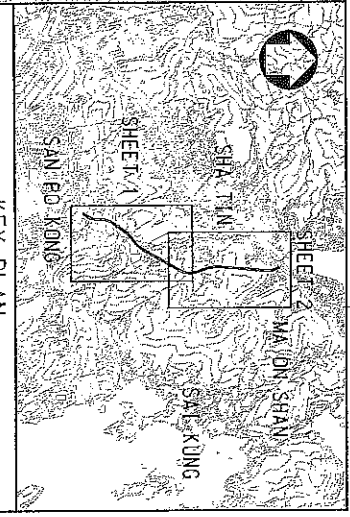
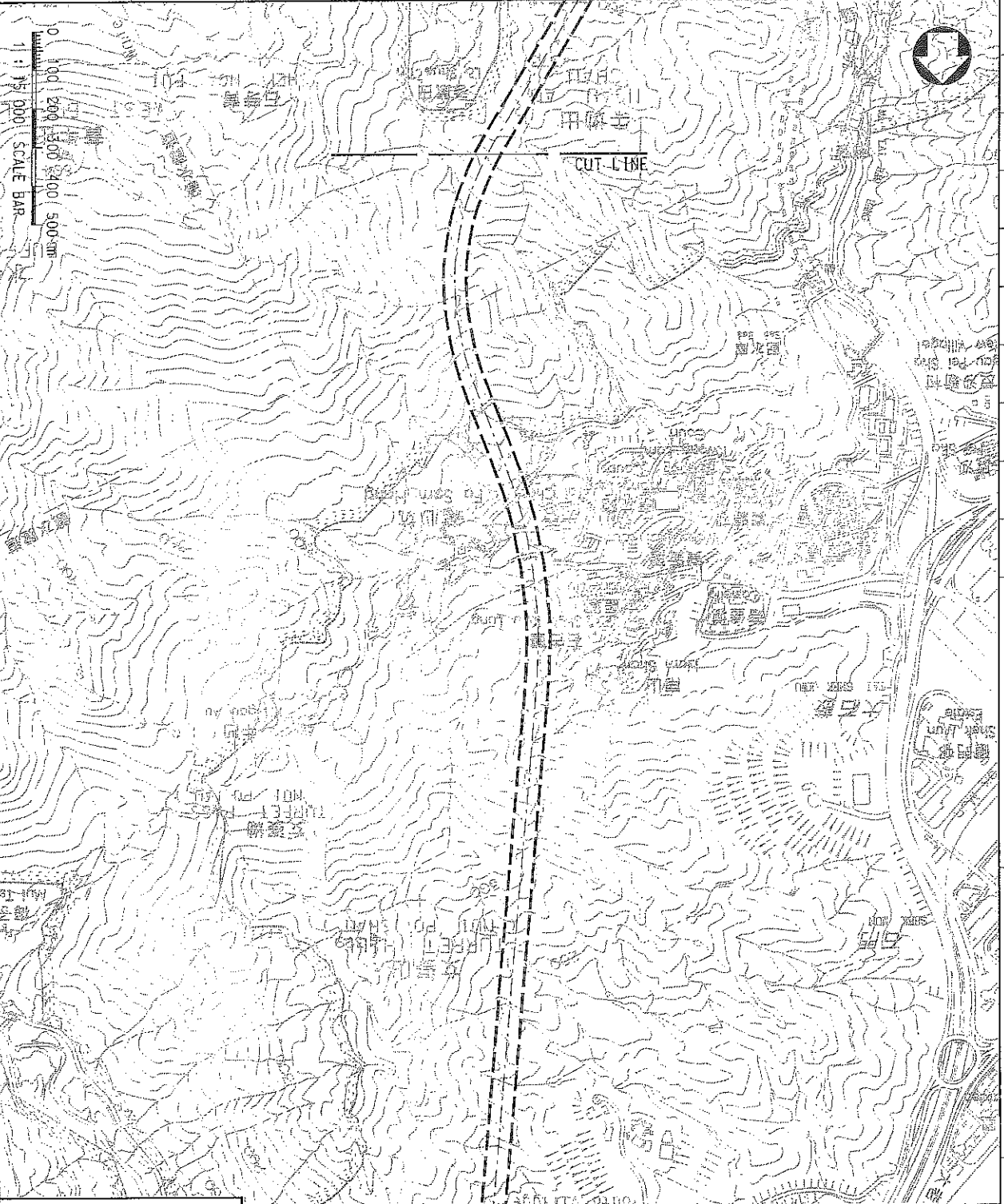
PLAN No. THET/01

TUNNEL PROTECTION ZONE OF TOLO HARBOUR EFFLUENT TUNNEL  
(SHEET 1 OF 2)

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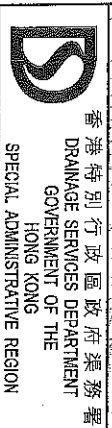
KEY PLAN  
SCALE 1 : 25000

LEGEND :

- CENTERLINE OF ADITS / TUNNEL
- BOUNDARY OF TUNNEL PROTECTION ZONE (30M EACH SIDE FROM THE CENTERLINE OF ADITS / TUNNEL)

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TUNNEL PROTECTION ZONE OF TOLO HARBOUR EFFLUENT TUNNEL  
(SHEET 2 OF 2)