

**Water Supplies Department  
Consultation Paper**

**PWP No.182WC  
Replacement and Rehabilitation of Water Mains, Stage 2**

**1. PURPOSE**

The purpose of this paper is to present to Members on the proposed replacement and rehabilitation of water mains to be carried out in Yau Tsim Mong District under this project and seek Members' support for the proposed works to proceed.

**2. BACKGROUND**

- 2.1. Hong Kong's existing fresh water and salt water supplies are provided through a network of water mains, approximately 7,400 kilometers (km) in length and about 45% of them were laid more than 30 years ago. They are approaching the end of their useful life and have become increasingly difficult and costly to maintain. With more water mains approaching the end of their service life, we are experiencing an increasing number of main bursts, which affect traffic, waste potable water and cause inconvenience to public.
- 2.2. Water Supplies Department (WSD) formulated a replacement and rehabilitation programme for water mains throughout the territory to prevent further deterioration of the water supply network. In view of the large scale of works and the long project duration, we have planned to carry out the programme in four stages. To bring about earlier improvement to the supply system and minimize inconvenience to the public due to frequent main bursts, we have advanced the completion of the whole programme from 2020 to 2015.
- 2.3. The Stage 1 of the programme is divided into two phases. The Stage 1 Phase 1 works are in progress for completion in December 2008 while the works of Stage 1 Phase 2 are scheduled to commence in August 2006 for completion in March 2010. The Stage 2 works in Kowloon, i.e. the works being presented in this paper, are scheduled to commence in February 2007 to replace and rehabilitate approximately 110 km of fresh and salt water mains. The anticipated completion of the Stage 2 construction works will be June 2011. The Stage 3 and Stage 4 of the programme are in the detailed planning stage and initial planning stage respectively

2.4. In August 2005, Water Supplies Department commissioned Maunsell – Metcalf & Eddy Joint Venture to undertake the investigation, detailed design and construction of the Stage 2 works in Kowloon area. At the moment, the Consultant has already conducted thorough investigation and proposed the preliminary replacement and rehabilitation schemes. Detailed design stage has been on-going to refine the design after receiving comments from relevant parties, including comments given by the District Councils during the consultation on the Stage 2 works.

### **3. BENEFITS ARISING FROM THE PROJECT**

With implementation of the Project, we aim to improve the reliability of the supply system, thereby reducing the number of pipe bursts and associated disruption to the minimum.

### **4. SCOPE OF WORKS IN YAU TSIM MONG DISTRICT**

The scope of works under 182WC in Yau Tsim Mong District (Refer to YTM FIG-1 to 7) comprises the following:

- (a) Approximately 2.6 km of fresh water mains and 1.8 km of salt water mains in Prince Edward and Tai Kok Tsui areas, with pipe diameter ranging from 50 mm to 450 mm;
- (b) Approximately 7.0 km of fresh water mains and 4.0 km of salt water mains in Mongkok area, with pipe diameter ranging from 50 mm to 450 mm; and
- (c) Approximately 4.6 km of fresh water mains and 0.8 km of salt water mains in Yau Ma Tei and Tsim Sha Tsui areas, with pipe diameter ranging from 250 mm to 600 mm.

### **5. EXPERIENCE GAINED FROM CONSULTATION OF REPLACEMENT AND REHABILITATION OF WATER MAINS STAGE 1 PHASE 2**

5.1. The consultation of the Stage 1 Phase 2 project with Yau Tsim Mong District Council Members was held on 25 August 2005 and the key comments were:

- (a) Potential traffic impacts and mitigation measures;
- (b) Environmental impacts and mitigation measures;
- (c) Co-ordination and interfacing with other projects;
- (d) Programme and duration of the works; and
- (e) Suspension of water supply

5.2. The following measures have been / will be undertaken based on the experience gained from the consultation of the Stage 1 phase 2 project:

- (a) Traffic impact assessment (TIA) was conducted to evaluate the impact of the works on all the critical junctions and mitigation measures were proposed. If it is technically feasible, trenchless method will be adopted to minimize the impacts on traffic. Please refer to Section 6 for details;
- (b) Environmental review was carried out to identify means to reduce environmental impacts to the absolute minimum. Please refer to Section 7 for details;
- (c) Liaison with all relevant government departments and utility undertakers was carried out to identify opportunities for entrustment and phasing of works to minimize the need for road opening through out the Investigation Stage of this project. Co-ordination will be continued at the detailed design stage (Please refer to Section 8 for details).
- (d) Term contract form will be adopted for the works. Works order will be issued in accordance with the working and traffic conditions so that the progress and duration of works can be effectively controlled; and
- (e) To liaise and consult affected public and residents, and to notify the consumers before suspension of water supply. It will be specified in the contract that the maximum duration of water supply suspension is restricted to 8 hours.

## 6. TRAFFIC IMPACT

- 6.1. The Traffic Impact Assessment (TIA) study was carried out in the Investigation Stage to identify the potential impacts on traffic due to construction of the works. The TIA indicated that traffic impact due to the proposed road openings could be mitigated with proposed temporary traffic management schemes for most road junctions. At locations, where traffic impacts are significant, trenchless / minimum dig techniques would be employed.
- 6.2. The study has also recommended a set of temporary management measures to minimize the impact of road opening works on both vehicular and pedestrian traffic operations during construction. The following guidelines have been followed in developing the temporary traffic management measures –
  - (i) Capacity assessment has been carried out to assess the impacts due to temporary lane closure and lane narrowing during construction to ensure that requirements stipulated by Transport Department are satisfied;
  - (ii) Feasible, safe and adequate traffic management measures in accordance with the Code of Practice for Lighting, Signing and Guarding of Road Works have been proposed;

- (iii) All vehicular accesses, pedestrian crossing facilities and the existing public transport operation will be maintained throughout the construction period. All excavation works crossing the vehicular accesses will be backfilled or covered with steel plate if necessary;
- (iv) Lane closure will inevitably be necessary during part of the proposed mainlaying works. However, all the existing traffic movements should be maintained as far as possible;
- (v) Construction would be carried out on a lane by lane basis, with each section not exceeding 60 m in length. A minimum separation of 100m between any two adjacent sections of works area shall be maintained; and
- (vi) Road width of not less than 3.5m shall always be maintained for safe passage of fire appliances and emergency vehicles. Any excavation / construction works will not cause obstruction to nearby fire hydrants and their control valves in-situ. Should any relocation/blanking-off of fire hydrants be necessary, prior consent from Fire Services Department has to be sought.

Moreover, the contractor(s) will be required to submit detailed temporary traffic management schemes using updated traffic counts, on-site trial runs for approval from relevant authorities before commencement of works.

6.3. The traffic impacts arising from the proposed works can be kept within acceptance levels by implementing temporary traffic management measures during construction. The proposed temporary traffic management schemes and mitigation measures for major critical junctions are summarized in Table 6.1.

**Table 6.1 Summary of the Proposed TTM Schemes and Mitigation Measures**

Road Junction	Proposed TTM Schemes / Mitigation Measures
Nathan Road / Mong Kok Road	Trenchless method has been recommended. One lane closure will be required at both Nathan Road and Mong Kok Road. The junction will be overloaded during peak hours of construction stage. Since the junction is consistently busy during day time, night work is recommended (i.e. 2200 – 0700). The works area will be decked over and open to public during non-working period

Road Junction	Proposed TTM Schemes / Mitigation Measures
Nathan Road / Argyle Street	Trenchless method has been recommended. One lane closure will be required at Nathan Road. The junction will be overloaded during peak hours of construction stage. Since the junction is consistently busy during day time, night work is recommended (i.e. 2200 – 0700). The works area will be decked over and open to public during non-working period
Nathan Road / Waterloo Road	Trenchless method has been recommended. One lane closure will be required at Nathan Road. The junction will be overloaded during peak hours of construction stage. Since the junction is consistently busy during day time, night work is recommended (i.e. 2200 – 0700). The works area will be decked over and open to public during non-working period
Nathan Road / Salisbury Road	Trenchless method has been recommended along Nathan Road. One lane closure will be required at Salisbury Road. The junction will perform satisfactorily during construction stage. Opening of working pits at the junction is acceptable.
Nathan Road / Haiphong Road	Trenchless method has been recommended along Nathan Road. One lane closure will be required at Nathan Road. The junction will perform satisfactorily during construction stage. Opening of working pits at the junction is acceptable.

6.4. We have consulted Transport Department, Highways Department and Hong Kong Police Force on the TIA findings and the proposed temporary traffic management. They have in general no adverse comment on the traffic aspects. We shall liaise closely with the relevant transport authorities during the construction stage and shall minimize any traffic impacts.

## 7. ENVIRONMENTAL REVIEW

7.1. In the environmental review carried out at the Investigation Stage, air quality, noise, water quality, waste and ecological impacts have been assessed. The assessment criteria followed all relevant statutory requirements. Environmental Protection Department (EPD) agreed with the findings and conclusions in the report and has approved the mitigation measures proposed.

7.2. Based on the findings of the environment review, no insurmountable environmental impact is expected for both the construction and operation phase of the project. Key findings of the reviews and the mitigation measures proposed are described as follows.

(i) Noise

The result of this study has identified noise sensitive receivers are the hospitals, schools, churches, temples and homes for the elderly that are located within 10m of the boundary of working areas (Refer to Appendix A). Monitoring will be carried out during construction to ensure that these sensitive receivers will not be adversely affected by the noise generated from the works. The following measures will also be adopted to reduce the construction noise:

- Use silencer to reduce noise;
- Use noise barrier to reduce noise impact;
- Use insulator to fully cover the high noise level plant;
- Avoid using many high noise level plant at the same time; and
- Restrict working in the vicinity of school during examination periods.

(ii) Dust

Dust level generated by excavation is also classified as low and can be effectively controlled by water spraying. Excavated materials and other wastes will be removed off site on the day of excavation. If it is not possible to do so, then the materials will be protected by tarpaulin sheets. We will include the requirements of Air Pollution Control (Construction Dust) Regulation and “Recommended Pollution Control Requirements for Construction Contracts” issued by EPD into the works contracts to ensure that compliance with the statutory guidelines are met at all times.

(iii) Site Run-off

All site run-off generated from construction works will be treated in accordance with the Water Pollution Control Ordinance before discharge into the drainage system to avoid contamination.

## 8. INTERFACING OF WORKS

8.1. In order to have a better management of road openings works, we are undertaking, under appropriate condition, to entrust parts of the proposed mainlaying works to other interfacing works contracts. We will keep close liaison with relevant government departments and utilities undertakers to ensure that the co-ordinated works will be carried out smoothly and causing minimum disruption to the public. A list of possible interfacing projects is included in Appendix B.

## **9. METHODOLOGY**

- 9.1. Traditionally, deteriorated water mains were replaced by laying new water mains alongside the existing mains by trenching method. This method involves excavating a trench of the full length of the existing water main.
- 9.2. In recent years, Water Supplies Department started to use trenchless techniques in replacing the water mains, which effectively reduce the extent of trench excavation and hence the disruption to general public. Details of those methods are included in Appendix C. Therefore, trenchless techniques will be adopted in areas where traffic or environmental effects are of major concerns. However, there are limitations in the techniques, such as excavation for launching pits, tee connections and bend installations. The choice of technique depends on various factors, including the site condition, construction constraints, choice of materials and impact to traffic and environment. In Yau Tsim Mong District, the percentage of pipes to be replaced / rehabilitated using open cut and trenchless methods are about 60% and 40% respectively.

## **10. LAND RESUMPTION**

No private land resumption is required as the proposed water mains are to be laid on public roads, footpaths and government lands.

## **11. CONSTRUCTION PROGRAMME**

The proposed works under this Project are scheduled to be carried out between February 2007 and February 2011. The programme allows for full compliance with all statutory procedures. Road opening will be carried out section by section in a co-ordinated manner to suit the actual traffic conditions.

## **12. PUBLIC CONSULTATION**

We will report to the District Council regularly in order to maintain close liaison with public and smoothen the project progress. If it is necessary, we will attend local consultation activities, provide detailed information of the proposed works and the affected area, understand and respond to the public on the concerned matters. We will also attend to the comments and handle the complaints made by the public so that the condition can be improved promptly. We welcome any comments / suggestions from the District Members at any time in respect of the works.

**Water Supplies Department**  
**April 2006**

## **Appendix A – List of Sensitive Receivers**

### **Yau Tsim Mong District**

#### **Mongkok area**

- CCC Mongkok Christian Center
- CCC Mongkok Church Kai Oi School
- Chi Kit School
- H.K. Vernacular Normal School Alumni Assn. School

#### **Yau Ma Tei and Tsim Sha Tsui areas**

- Hong Kong Polytechnic University
- St. Mary Canossian College
- Rosary Church
- Hong Kong Museum of History
- St. Andrew Church
- Kowloon Mosque and Islamic Centre
- Health Education Exhibition and Resource Centre
- Former Marine Police Headquarters

**Appendix B – Potential Interfacing Projects**

<b>Project Name</b>	<b>Relevant Government Department / Consultants</b>	<b>Related Locations</b>	<b>Anticipated Starting Date</b>	<b>Anticipated Completed Date</b>	<b>Mitigation Measures</b>
Cherry Street Project	Urban Renewal Authority	Tai Kok Tsui – Cherry Street	---	---	Water mains between Foo Kwai Street and Cheery Street have been re-routed by the contractor of Urban Renewal Authority. No interface is envisaged after re-routing.

## Appendix C – Brief Description of Trenchless Techniques

There are several trenchless (or minimum dig) techniques available in replacement or rehabilitation of water mains. In these techniques, a new pipe is 'launched' from a pit and travels along the existing pipe route to receiving pit. Under ideal conditions, a pipe can travel up to about 100 meters. There are, however, limitations in the techniques. In practice, bends in the existing water mains would shorten the length of water main to be rehabilitated. Apart from the pits required to 'launch' the new pipe, it is necessary to reconnect the existing tees and have, therefore, resulted in opening of small pits. Trenchless techniques are sometimes referred to as 'no dig'. This is misleading. Minimum dig or 'reduced dig' (as compared with traditional open cut method) is a more accurate term. The followings are some brief descriptions of the techniques –

**(a) Pipe Bursting**

In pipe bursting, a pneumatic or hydraulic bursting tool is forced through the inside of an existing water main causing it to burst. Fragments of the existing water main are pushed into surrounding soil by a spreader and a new pipe is installed in the vacated space. The new pipe may, if required, be slightly larger than the old pipe. This technique can be used with most pipe types up to 250 millimeters in diameter.

**(b) Slip lining**

Slip lining involves the insertion into the existing water main of a single continuous pipe or jointed sections of pipe. The technique can be used for most pipe diameters. Pre-sterilized rolls of pipe are available in diameter up to 180 millimeters. The use of pre-sterilized pipe enables customers to be re-connected to water supply quickly.

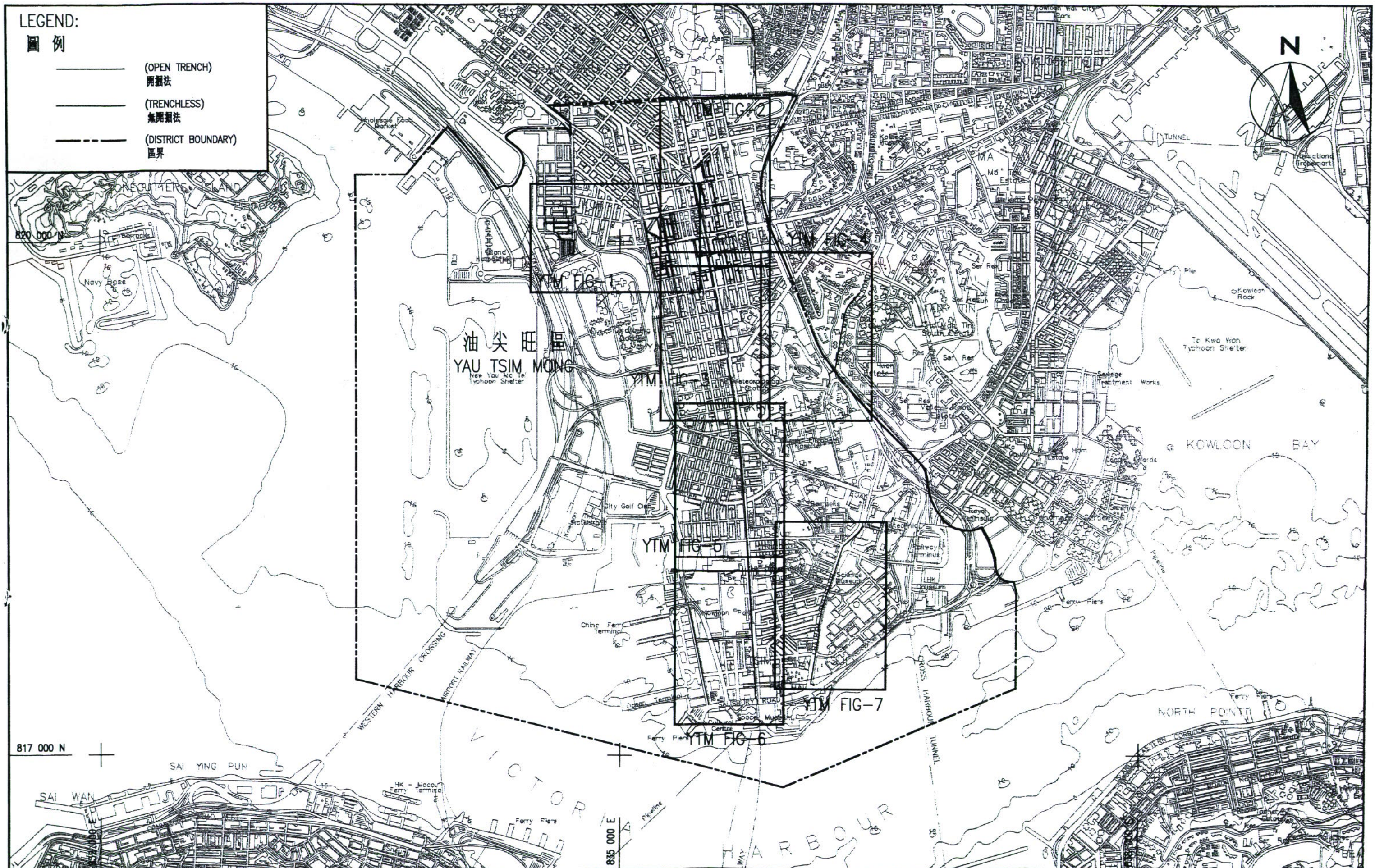
**(c) Close fit lining**

Close fit lining technique involves the insertion of a temporarily reduced diameter or re-shaped pipe into an existing water main. The inserted pipe will be inverted to its original size on completion of the insertion process. These techniques rely on the flexibility and toughness of polyethylene pipe to revert to its original size after being deformed. There is a small reduction in internal pipe diameter.

LEGEND:

圖例

-  (OPEN TRENCH)  
開掘法
-  (TRENCHLESS)  
無開掘法
-  (DISTRICT BOUNDARY)  
區界

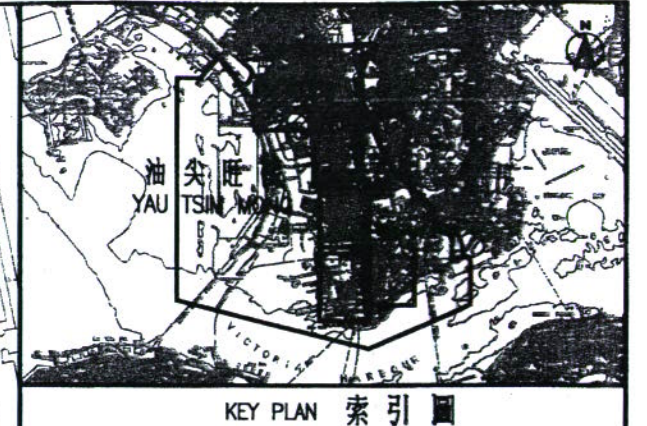


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AGREEMENT No. CE 5/2005 (WS) REPLACEMENT AND REHABILITATION OF  
WATER MAINS STAGE 2 MAINS IN KOWLOON - INVESTIGATION, DESIGN AND CONSTRUCTION

WATER MAINS ALIGNMENT - YAU TSIM MONG 水管路線 - 油尖旺區

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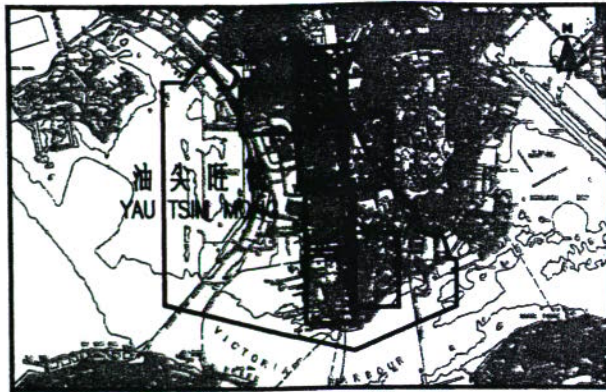
**LEGEND:**  
圖例

	FRESH WATER MAINS (OPEN TRENCH) 食水管(開掘法)
	FRESH WATER MAINS (TRENCHLESS) 食水管(無開掘法)
	SALT WATER MAINS (OPEN TRENCH) 海水管(開掘法)
	SALT WATER MAINS (TRENCHLESS) 海水管(無開掘法)
	(DISTRICT BOUNDARY) 區界
	600 PROPOSED WATER MAIN DIAMETER (mm) 擬定喉管直徑(毫米)

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WATER MAINS STAGE 2 MAINS IN KOWLOON - INVESTIGATION, DESIGN AND CONSTRUCTION  
**WATER MAINS ALIGNMENT - YAU TSIM MONG 水管路線 - 油尖旺區**

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KEY PLAN 索引圖

LEGEND:

圖例

- FRESH WATER MAINS (OPEN TRENCH)  
食水管 (開掘法)
- FRESH WATER MAINS (TRENCHLESS)  
食水管 (無開掘法)
- SALT WATER MAINS (OPEN TRENCH)  
海水管 (開掘法)
- SALT WATER MAINS (TRENCHLESS)  
海水管 (無開掘法)
- (DISTRICT BOUNDARY)  
區界
- 600 PROPOSED WATER MAIN DIAMETER (mm)  
擬定喉管直徑 (毫米)

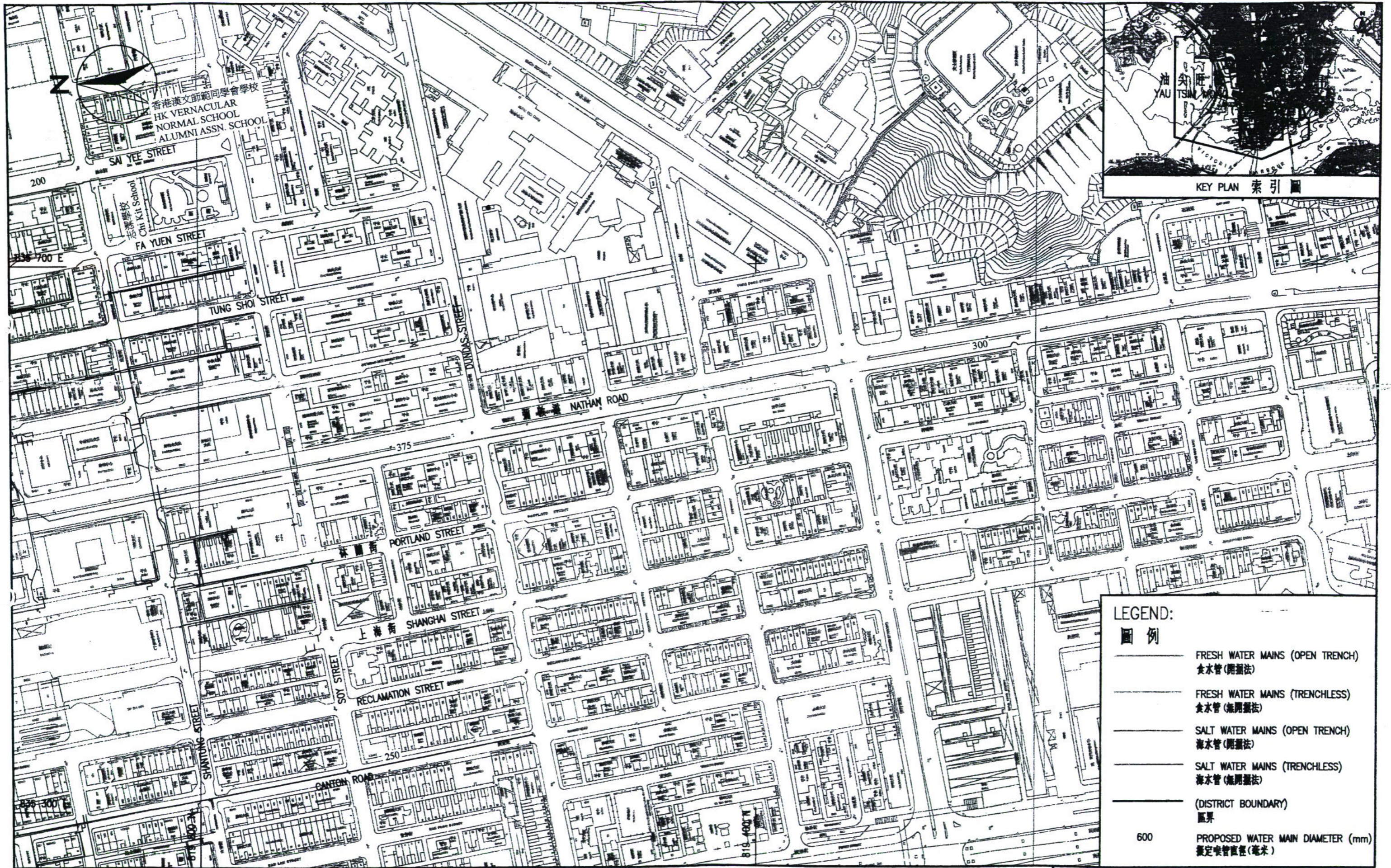


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WATER MAINS STAGE 2 MAINS IN KOWLOON - INVESTIGATION, DESIGN AND CONSTRUCTION

WATER MAINS ALIGNMENT - YAU TSIM MONG 水管路線 - 油尖旺區

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**LEGEND:**  
圖例

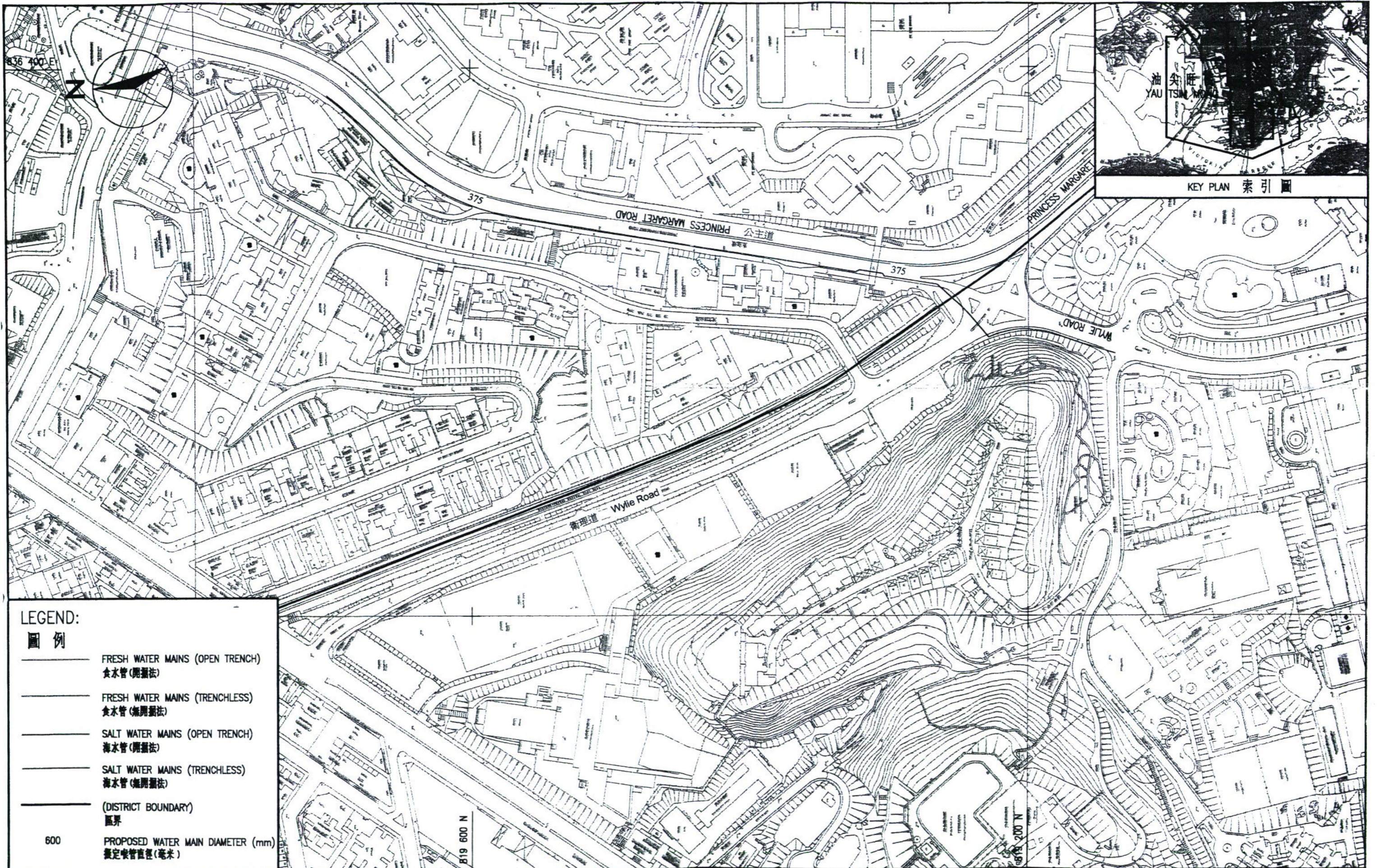
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食水管(開掘法)
- FRESH WATER MAINS (TRENCHLESS)  
食水管(無開掘法)
- SALT WATER MAINS (OPEN TRENCH)  
海水管(開掘法)
- SALT WATER MAINS (TRENCHLESS)  
海水管(無開掘法)
- (DISTRICT BOUNDARY)  
區界
- 600  
擬定水管直徑 (毫米)

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WATER MAINS STAGE 2 MAINS IN KOWLOON - INVESTIGATION, DESIGN AND CONSTRUCTION

WATER MAINS ALIGNMENT - YAU TSIM MONG 水管路線 - 油尖旺區

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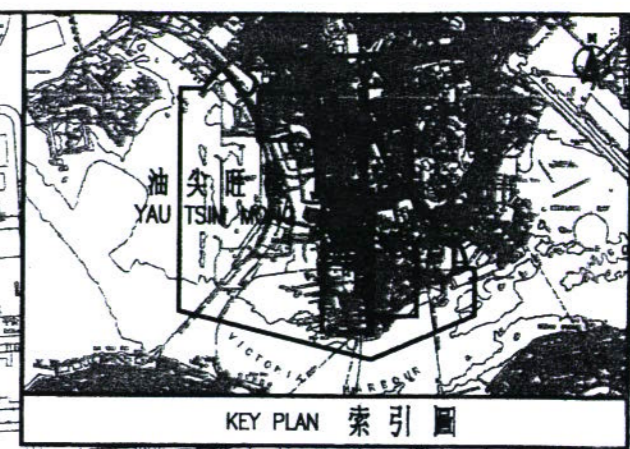
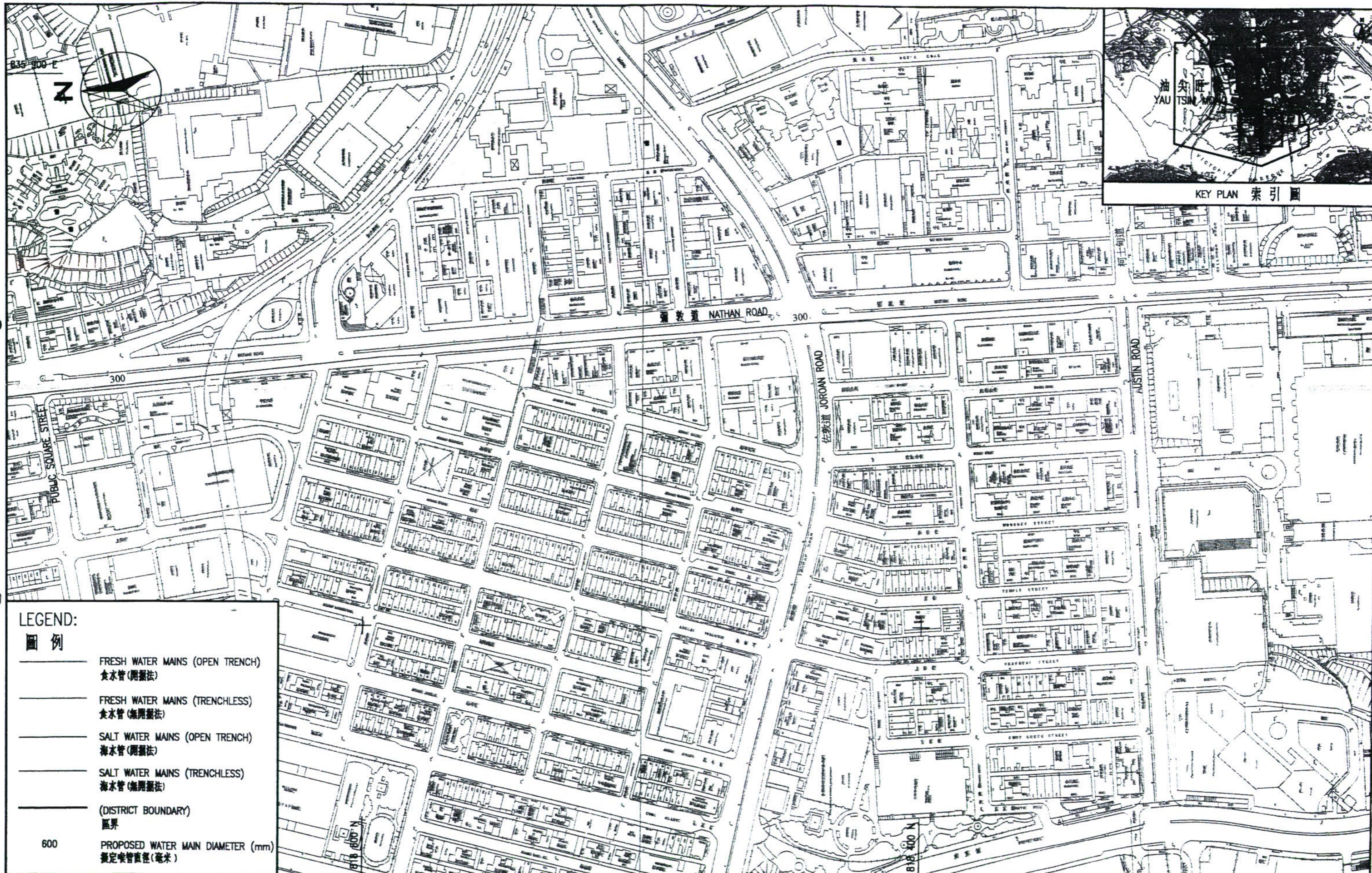
- FRESH WATER MAINS (OPEN TRENCH)  
食水管(開掘法)
- FRESH WATER MAINS (TRENCHLESS)  
食水管(無開掘法)
- SALT WATER MAINS (OPEN TRENCH)  
海水管(開掘法)
- SALT WATER MAINS (TRENCHLESS)  
海水管(無開掘法)
- (DISTRICT BOUNDARY)  
區界
- 600 PROPOSED WATER MAIN DIAMETER (mm)  
擬定喉管直徑(毫米)

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AGREEMENT No. CE 5/2005 (WS) REPLACEMENT AND REHABILITATION OF  
WATER MAINS STAGE 2 MAINS IN KOWLOON - INVESTIGATION, DESIGN AND CONSTRUCTION

**WATER MAINS ALIGNMENT - YAU TSIM MONG 水管路線 - 油尖旺區**

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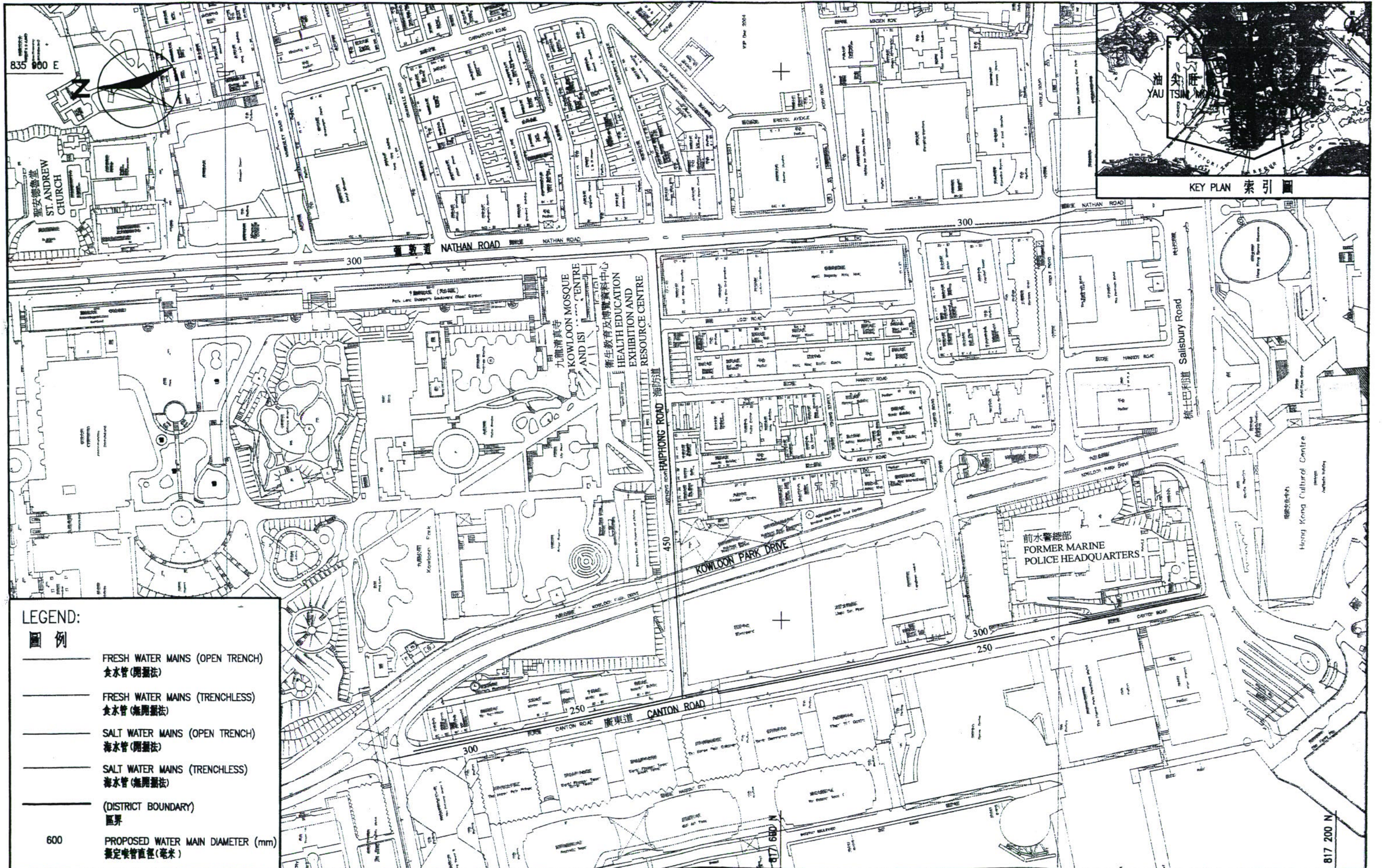
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	FRESH WATER MAINS (TRENCHLESS) 食水管 (無開掘法)
	SALT WATER MAINS (OPEN TRENCH) 海水管 (開掘法)
	SALT WATER MAINS (TRENCHLESS) 海水管 (無開掘法)
	(DISTRICT BOUNDARY) 區界
	600 PROPOSED WATER MAIN DIAMETER (mm) 擬定喉管直徑 (毫米)

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WATER MAINS STAGE 2 MAINS IN KOWLOON - INVESTIGATION, DESIGN AND CONSTRUCTION

WATER MAINS ALIGNMENT - YAU TSIM MONG 水管路線 - 油尖旺區

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**LEGEND:**  
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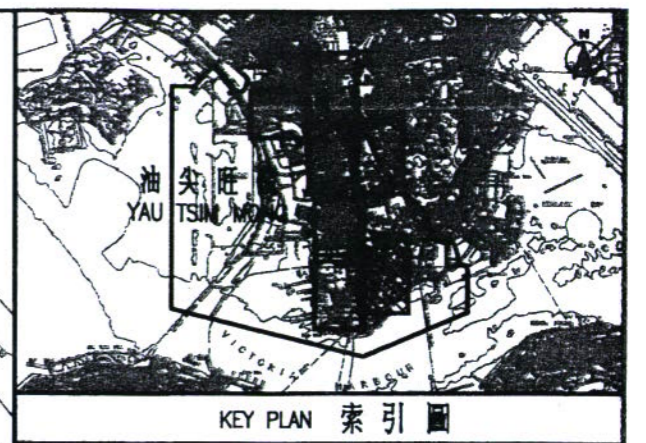
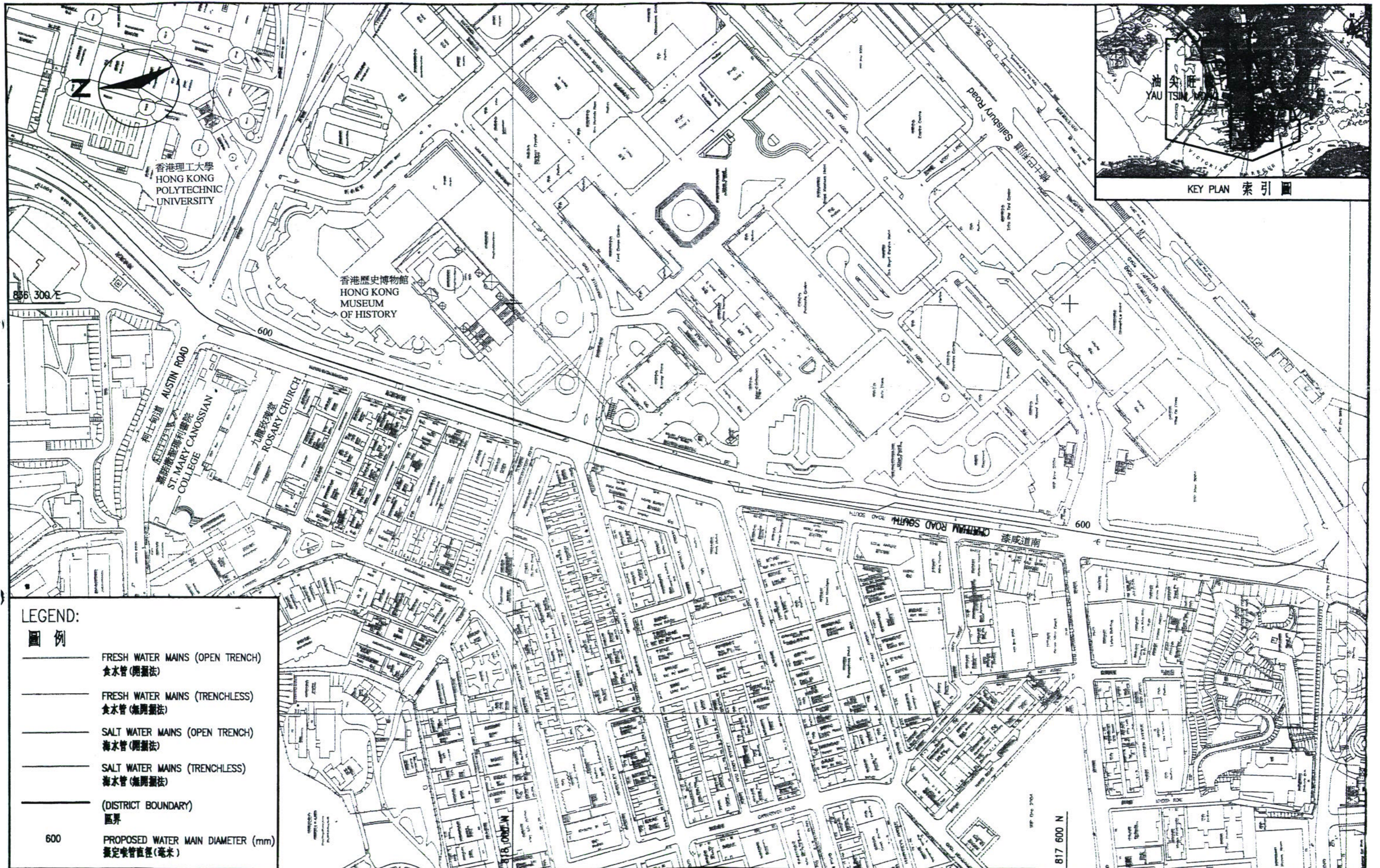
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	SALT WATER MAINS (TRENCHLESS) 海水管(無開掘法)
	(DISTRICT BOUNDARY) 區界
	600 PROPOSED WATER MAIN DIAMETER (mm) 擬定喉管直徑(毫米)

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WATER MAINS STAGE 2 MAINS IN KOWLOON - INVESTIGATION, DESIGN AND CONSTRUCTION

WATER MAINS ALIGNMENT - YAU TSIM MONG 水管路線 - 油尖旺區

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**LEGEND:**  
圖例

	FRESH WATER MAINS (OPEN TRENCH) 食水管 (開掘法)
	FRESH WATER MAINS (TRENCHLESS) 食水管 (無開掘法)
	SALT WATER MAINS (OPEN TRENCH) 海水管 (開掘法)
	SALT WATER MAINS (TRENCHLESS) 海水管 (無開掘法)
	(DISTRICT BOUNDARY) 區界
	600 PROPOSED WATER MAIN DIAMETER (mm) 擬定水管直徑 (毫米)

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WATER MAINS STAGE 2 MAINS IN KOWLOON - INVESTIGATION, DESIGN AND CONSTRUCTION

WATER MAINS ALIGNMENT - YAU TSIM MONG 水管路線 - 油尖旺區

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