

**Islands District Council**  
**Paper IDC 39/2008**

**Agreement No. CE 36/2006(WS)**  
**Replacement and Rehabilitation of Water Mains Stage 3**  
**Mains on Hong Kong and Islands - Investigation, Design and Construction**

**1. Purpose**

- 1.1 The Water Supplies Department (WSD) consulted the former Environmental Improvement and Food Hygiene Committee of the Islands District Council in 2006 regarding the project "Replacement and Rehabilitation of Water Mains Stage 2, Mains on Hong Kong and Islands – Investigation, Design and Construction" and had obtained valuable comments and support from the Members. The Water Mains Replacement and Rehabilitation Programme (WMR&RP) is now proceeding to Stage 3. The purposes of this consultation paper are to obtain advice and to seek support from the Islands District Council for the Stage 3 of this project.

**2. Background**

- 2.1 Hong Kong's existing fresh water and salt water supplies are provided through a network of water mains, approximately 7,600 kilometers (km) in length and about 3,000 km of them were laid more than 30 years ago. The latter are approaching the end of their service 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 leaks and bursts, which affect traffic, waste potable water and cause inconvenience to the public.
- 2.2 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 considerable length of the water mains to be replaced / rehabilitated and the long construction period, WSD had programmed the works to be carried out in four stages. To bring about early improvement to the water supply system and to minimize inconvenience to the public caused by frequent main bursts, WSD have advanced the completion of the whole programme by 5 years from 2020 to 2015.
- 2.3 The Stage 1 and Stage 2 of the WMR&RP in Hong Kong Island and the Outlying Islands have already commenced. Stage 1 works have been completed while Stage 2 works are scheduled to complete in 2011. The Stage 2 works covers the replacement and rehabilitation of approximately 28 km water mains in Islands District.
- 2.4 In January 2007, WSD commissioned Maunsell – Metcalf & Eddy Joint Venture to undertake the investigation study, detailed design and construction supervision of the Stage 3 works, Mains on Hong Kong and Islands. At the moment, the Consultants has already conducted 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 public consultation process on the Stage 3 works. The Stage 4 of the WMR&RP is in the planning stage.

### **3. Scope of Works in Islands District**

3.1 The scope of works of the subject project comprises replacement and rehabilitation of about 251 km of fresh and salt water mains in Hong Kong Island and Outlying Islands. Approximately 18.5 km of these water mains are in Islands District, which comprise the following:

- (a) Approximately 2.7 km of fresh water mains in Tai O area, Lantau, with pipe diameter ranging from 20 mm to 100 mm;
- (b) Approximately 5.0 km of fresh water mains in Shek Pik area, Lantau , with pipe diameter ranging from 150 mm to 200 mm;
- (c) Approximately 5.8 km of fresh water mains in Cheung Chau, with pipe diameter ranging from 25 mm to 450 mm; and
- (d) Approximately 5.0 km of fresh water mains on Lamma Island, with pipe diameter ranging from 25 mm to 400 mm.

3.2 The location layouts of the water mains are shown in Figures I-0 to I-5 and details of the water mains are listed in **Appendix A**.

### **4. Methodology of Replacement and Rehabilitation**

4.1 The traditional open cut replacement method is to replace the existing water mains by open trench excavation and laying a new water main alongside the existing main. Although it will create more disturbances, the open cut method is more practicable particularly for small diameter water mains and in restricted works areas. Therefore, application of the open cut method is more suitable for the replacement of water mains in Islands District.

4.2 WSD will adopt the following measures to ensure smooth implementation of the works:

- Conduct detailed pre-construction surveys to investigate underground conditions to avoid damaging water mains and other utilities during construction;
- Provide temporary by-pass mains to minimize the time of water suspension;
- Arrange water supply suspensions by matching with the user consumption patterns and limiting the supply suspensions to 8 hours;

- Set up a liaison team during construction to liaise with the public to coordinate supply suspension and other activities;
- Evaluate different forms of contract management to control the programme and duration of works effectively; and
- Improve construction method and contract management based on the experiences gained in previous similar projects.

## **5. Experience Gained from Previous Projects of Replacement and Rehabilitation of Water Mains**

5.1 Having reviewed experience gained in previous similar projects, we will adopt the following measures so as to minimize the risk of project delay:

- (a) Traffic impact assessment (TIA) was conducted to evaluate the impact of the works on all the critical junctions and mitigation measures were proposed. In addition, updated information will be collected from all the interfacing project proponents 6 months prior to commencement of the works for review of nearby traffic conditions;
- (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 with interfacing projects was carried out to identify opportunities for entrustment and phasing of works to minimize the need for road opening throughout the Investigation Stage of this project. Co-ordination will be continued at the detailed design and construction stages;
- (d) The water main replacement and rehabilitation projects have been coordinated to minimize road openings at the same location / traffic lane as far as practicable;
- (e) 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;
- (f) Experienced resident site staff will be employed to supervise the works; and
- (g) We will liaise and consult affected public and residents, and to notify the consumers before suspension of water supply. It will be specified in the works contract that the maximum duration of water supply suspension is restricted to 8 hours. In addition, a liaison team with a hotline will be set up during construction to liaise with the public to coordinate supply suspension activities.

## **6. Traffic Impact**

- 6.1 The construction works will inevitably affect the traffic. A Traffic Impact Assessment (TIA) study for the proposed construction works had been prepared and endorsed by Transport Department, Hong Kong Police Force, Highways Department and Home Affairs Department. The results of the TIA indicated that the traffic impact, mainly due to the proposed road opening works, could be mitigated by implementation of appropriate temporary traffic management schemes.
- 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. Our contractor 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 Before the commencement of works in each area, our contractor will submit the construction details and the temporary traffic management schemes to the relevant government departments (including Transport Department, Road Management Office of Hong Kong Police Force, Highways Department, District Offices...etc.) for assessment and agreement.
- 6.4 With regard to the proposed routing of watermain within Lamma Island, Cheung Chau, Tai O and Shek Pik, there is no envisaged impact on vehicular traffic. However, influx of pedestrian flow especially during the weekends and public holidays has been considered in the study and provision of temporary decking is proposed to cover the excavated areas if necessary during the period of construction.
- 6.5 We will also consult the relevant District Council Members before commencement of the works in local area.

## **7. Environmental Review**

- 7.1 We have completed an environmental review in which the 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.

(a) Noise

The result of this study shows noise impacts during the construction phase will be related to noise produced from plant and equipment, noise sensitive receivers identified are the hospitals, schools, churches, temples and homes for the elderly that are located within 10m of the boundary of working areas. 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.

(b) 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.

(c) 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.

- 7.3 The findings of the environmental review also indicated that no existing trees and buildings of cultural heritage interests would be affected. Nevertheless, the water mains will be aligned away from the existing trees and buildings of cultural heritage interests as far as possible. If part of the works must be carried out near buildings of cultural heritage interests, we will consult the Antiquities and Monuments Office (AMO) of Leisure and Cultural Services Department and will implement appropriate measures to minimize the effects to these historical buildings.

## **8. Interfacing of Works**

- 8.1 The major consideration in programming the works is the coordination with various parties to avoid repetitive road openings. Road opening will be carried

out section by section in a coordinated manner to suit the traffic conditions and actual needs.

8.2 We have been conducting detailed and comprehensive reviews on project interfaces with other government departments and utility undertakers. To avoid impacts arising from these interfacing projects, WSD will consider carrying out the works in sections, entrusting part of the works to other departments or carrying out the works concurrently in common trench with other underground utilities. WSD will continue to further discuss these options with the relevant parties with a view to arriving at the most effective construction arrangement. A list of potential interfacing projects which have been coordinated is included in **Appendix B**.

8.3 As mentioned in Section 5(e), term contract type re-measurement contracts will be adopted in this project to allow flexibility for programming of works. This form of contract is particularly suitable for works which require considerable coordination with others. It can facilitate necessary amendment to suit actual site conditions. By issuing Works Orders after confirming the design on site, risks can be minimized. The programme and duration of the works can also be controlled effectively and disruption to the public and traffic can be minimized.

## **9. Public Consultation**

9.1 In order to maintain close liaisons with the public and smoothen the progress of the project, we will, where necessary, consult the relevant District Council Members regarding the actual construction arrangement before commencement of the works in local areas. If necessary, we will attend local consultation activities, provide detailed information of the proposed works and the affected areas, 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 in order to ensure any unfavourable condition can be rectified promptly. We welcome any comments / suggestions from the District Council Members at any time in respect of the works.

9.2 We will set up a liaison team and a hotline during construction. The liaison team will have dedicated staff to receive and follow up on public suggestions and complaints to ensure prompt rectification measures are taken when necessary. We will also launch various public liaison activities to ensure smooth implementation of the construction works and to enhance communication with the public. These activities include providing details of our works and the areas affected, the appreciation and responding to public concerns.

## **10. Land Matter**

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**

This project will be submitted to the Finance Committee of Legislative Council in mid 2008 for approval. Subject to the funding being made available, we will proceed with the tender invitation process. The proposed works under this project are scheduled to commence in December 2008 and for completion in October 2013. During the construction stage of the project, WSD will regularly report to the Islands District Council the latest construction progress and the implementation schedule.

**Water Supplies Department  
April 2008**

## Appendix A - Summary of Proposed Works

| Figure No.         | Name of Road / Region   | Diameter of the Proposed Water Mains to be Replaced (mm) | Length of the Proposed Water Mains to be Replaced (m) |
|--------------------|---|--|---|
| <b>Tai O</b>       |   |  |   |
| I-1                | Kat Hing Back Street  | 25-100   | 480   |
|                    | Kat Hing Street   | 80   | 30  |
|                    | Shek Tsai Po Street   | 20-100   | 1370  |
|                    | Sun Ki Street   | 50-80  | 510   |
|                    | Tai O Market Street   | 50-100   | 90  |
|                    | Tai O Tai Ping Street (backlane)  | 50   | 130   |
|                    | Tai O Wing On Street (backlane)   | 25-40  | 60  |
| <b>Shek Pik</b>    |   |  |   |
| I-2                | Shek Pik Tunnel C   | 150  | 3890  |
| I-3                | Keung Shan Road   | 150-200  | 1060  |
| <b>Cheung Chau</b> |   |  |   |
| I-4                | Cheung Kwai Estate  | 300  | 260   |
|                    | Cheung Kwai Road  | 150  | 50  |
|                    | Chung Hing Back Street  | 40   | 20  |
|                    | Chung Hing San Street   | 80   | 160   |
|                    | Chung Hing Praya Street   | 80   | 20  |
|                    | Chung Hing Street   | 80   | 430   |
|                    | Chung Hok Road  | 50-200   | 200   |
|                    | Chung Sum Lane  | 80-150   | 90  |
|                    | Footpath between Cheung Chau Service Reservoir and Pak She San Tsuen      | 150-450  | 1150  |
|                    | Footpath between Tai Kwai Wan San Tsuen and Cheung Chau Service Reservoir | 150-450  | 510   |
|                    | Kin San Lane  | 80-200   | 110   |
|                    | Ko Shan Tsuen   | 40-80  | 410   |
|                    | Kwok Man Road   | 50-250   | 190   |
|                    | Middle Hill Road  | 100  | 100   |
|                    | Pak She Back Street   | 40-80  | 300   |
|                    | Pak She San Tsuen   | 25   | 80  |
|                    | Peak Road   | 40-100   | 710   |
|                    | Peak Road West  | 50-80  | 120   |
|                    | Sai Wan Road  | 80-150   | 170   |
|                    | San Kai Shi Lane  | 80   | 40  |
|                    | Siu Sik Lane  | 150  | 60  |
|                    | Tai San Praya Road  | 50-150   | 240   |
|                    | Tai San Street  | 150  | 90  |
|                    | Tai Shek Hau  | 25-50  | 120   |
|                    | Tai Shek Hau Road   | 150  | 170   |



# Appendix A - Summary of Proposed Works (Cont'd)

| Figure No.          | Name of Road / Region      | Diameter of the Proposed Water Mains to be Replaced (mm) | Length of the Proposed Water Mains to be Replaced (m) |
|---------------------|----------------------------|--|---|
| <b>Lamma Island</b> |                            |  |   |
| I-5                 | Ko Long                    | 80   | 150   |
|                     | Long Tsai Tsuen            | 80-400   | 970   |
|                     | Nga Kau Wan                | 80   | 90  |
|                     | Sha Po New Village         | 50   | 10  |
|                     | Sha Po Old Village         | 100  | 150   |
|                     | Tai Ling Tsuen             | 400  | 110   |
|                     | Tai Peng                   | 25-150   | 1730  |
|                     | Tai Shan East              | 40-80  | 110   |
|                     | Tai Wan San Village        | 80   | 130   |
|                     | Tai Wan To                 | 250  | 250   |
|                     | Tai Yuen Village           | 50-80  | 270   |
|                     | Yung Shue Long New Village | 150  | 280   |
|                     | Yung Shue Wan Back Street  | 50-80  | 90  |
|                     | Yung Shue Wan Main Street  | 25-150   | 660   |

## Appendix B - Potential Interfacing Projects

| Relevant Government Department / Consultants   | Project Title  | Current Programme      |
|--|--|------------------------|
| Water Supplies Department / Black & Veatch Hong Kong Ltd                                     | Agreement No. CE 3/2005 (WS) - Replacement and Rehabilitation of Water Mains Stage 2 - Mains on Hong Kong and Islands - Investigation, Design and Construction | May 2007 to May 2011   |
| Drainage Services Department / Scott Wilson CDM Joint Venture                                | Agreement No. CE 20/2005 (DS) - Outlying Islands Sewerage Stage 1 Phase 1 Part 2 and Phase 2 on Yung Shue Wan and Sok Kwu Wan Sewerage                         | Mid-2007 to Mid-2010   |
| Drainage Services Department / Consultants Management Division                               | PWP Item 4354DS - Outlying Islands Sewerage Stage 2 - Tai O and Cheung Chau Sewerage Works   | Apr 2010 to Late 2013  |
| Civil Engineering and Development Department / Ho Tin & Associates Consulting Engineers Ltd. | PWP Item 7197CL - Cheung Chau Development Improvement to Existing Roads and Drains in Cheung Chau Old Town - Remaining Engineering Works                       | Late 2008 to Late 2011 |